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SUBJECTIVE AND PSYCHOMETRIC NON-COGNITIVE SCALES
IN RELATION TO OVER- AND UNDERACHIEVEMENT

BY



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A THESIS

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The undersigned certify that they have read, and
recommend to the Faculty of Graduate Studies for acceptance,
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SUBJECTIVE AND PSYCHOMETRIC NON-COGNITIVE SCALES

IN RELATION TO OVER- AND UNDERACHIEVEMENT

submitted by Peter Braun

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Master of Education.

ABSTRACT

In an attempt to identify study habits and attitudes which may be related to academic underachievement, this study explored the possibility of selecting clusters of homogeneous items from the Brown & Holtzman Survey of Study Habits and Attitudes such that scores on these clusters will yield a high correlation with over- and underachievement.

A sample of 229 overachievers and 182 underachievers was selected from the grade XII population of the Province of Alberta, and the Brown & Holtzman survey was administered to these students.

Their responses to each of the 100 items were then cluster-analyzed by the "method of homogeneous keying" of DuBois, Loevinger, and Gleser (1952). This technique yielded homogeneous clusters of items. Scores on these clusters were then compared to those on the a priori clusters of the SSHA using Hotelling's T^2 test for the comparison of means. The results showed that the psychometric scales were superior to the a priori scales in terms of reliability, efficiency, and orthogonality, but as good as the latter in terms of predicting over- or underachievement.

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CHAPTER ONE

THE PROBLEM AND ITS BACKGROUND

INTRODUCTION

For the purpose of this study, an underachiever is broadly defined as one whose achievement, as judged either by grades or by test scores, is substantially below what is expected of him on the basis of his aptitude for academic achievement. Obviously, an underachiever could be different from one whose achievement is low. Though underachievers are often low achievers, the reverse is not necessarily true. For example, a low achiever may well be operating at his maximum potential and yet remain a low achiever, while an underachiever, by virtue of his demonstrated academic potential, is capable of a much higher level of achievement than what his grades indicate. Hence, this definition also includes those whose achievement is quite high, but not high enough in relation to their potential.

Contrariwise, an overachiever is one whose grades or achievement test scores are substantially above his measured academic aptitude. Researchers have not paid as much attention to 'overachievers' as to 'underachievers', probably because it does not bother anybody if one achieves beyond one's potential. However, a consideration of 'overachieve-

ment' is a logical corollary of underachievement and, as such, is given some attention in this research.

CERTAIN OUTCOMES OF UNDERACHIEVEMENT

In the North-American society of today, one's occupational opportunities, socio-economic status, and the chance to get ahead are essentially dependent upon one's level of education. For example, Clark (1962, p.44-80) showed that in the United States, the life income of a college graduate is virtually twice that of a high school graduate who, in turn, will earn almost double the income of an early high school drop-out. Education has, therefore, been made freely and abundantly available to every citizen. Yet, while opportunities for education are widely open everywhere, and while educational achievement is amply rewarded, many people who have the intellectual potential fail to utilize it in academic achievement. Chabassol (1959, p.2), for instance, stated:

"Academic underachievement is one of the most serious problems which school administrators, teachers, counselors, and parents must cope with today. At every level, both in school and university, there are to be found students who are doing mediocre work, or even failing, when, according to the results of standardized intelligence tests, they are capable of better performance."

When one considers the fact that many of the failures are due to underachievement rather than lack of potential, the importance of the problem becomes obvious. Underachieve-

ment can be especially serious these days in view of the declining opportunities for unskilled workers, and the rise in occupations which require some amount of specialized and post-secondary training.

The loss resulting from underachievement affects the individual, the school, and the society. The individual will likely suffer from a sense of failure, the school from wasted efforts, and the society from the loss of the contribution of its underachieving members. To minimize these losses, educators must come to grips with the problem of academic underachievement and attempt to provide a solution.

CERTAIN CATEGORIES OF UNDERACHIEVEMENT

Most underachievers can be divided into two categories - chronic and situational. The chronic underachiever is one who consistently, from year to year, performs below his ability level. The situational underachiever, on the other hand, exhibits underachievement which is usually transitory in nature, and often results from identifiable causes such as serious illness and emotional upsets.

Research seems to indicate that most underachievers at the high school level have been underachieving chronically, and usually from an early age (Barrett, 1957; Chabassol, 1959; Shaw & McCuen, 1960).

One could also mention a third type of underachievement.

A student belonging to this category does poorly on achievement tests, as well as on ability tests. Yet, when observing the behavior of such underachievers, one gains the impression that they are well endowed with ability. This kind of an underachiever is the most difficult to detect and needs special strategies for research.

THE PRESENT STUDY

As is shown in the chapter on review of literature, the extent of underachievement in the school is a real problem. While the mechanics of helping the underachiever are available in the form of counseling services and remedial classes, much needs to be done in regard to identifying the correlates of underachievement. The present research concerns itself with this problem.

A consideration of this problem raises two questions:

1. What factors differentiate underachievers from over-achievers?
2. Can these factors be measured reliably?

The most significant factor which differentiates underachievers from overachievers is, of course, their level of achievement in relation to their academic ability. Yet, underachievement, as defined earlier, uses 'ability' as the starting point. As such, correlates other than ability will be studied here. In this respect, the model

of Gibbs (1967) seems very helpful. According to him, almost all research on factors which correlate with academic achievement fits into the general equation:

$$\begin{array}{l} \text{Academic Performance} = \\ \text{Personality Factors} + \text{Environmental Factors} \end{array}$$

While Gibbs emphasized the importance of the environmental variables, there appears to be little in what educational institutions can do, or, are willing to do about changing a student's environment so as to make it more conducive to academic achievement. Moreover, since most school systems offer counseling services whose purpose it is to influence personality factors, it was decided to limit the present study to personality factors. Furthermore, since the definition of underachievement used here is based upon ability as a correlate, this study is limited to the exploration of non-intellectual personality factors which may be relevant to underachievement.

In addition, it was felt that a student's performance in high school has the greatest impact on his future vocational opportunities and decisions. Therefore, the population to be studied here will consist of high school underachievers.

The present research is intended to be part of a larger project, namely, the development of scales for predicting underachievement. As a first step in this direction, this study will investigate the feasibility of applying multivariate analyses to an attitudinal inventory. Hence the major emphasis of this research is methodological.

In summary, underachievement as a serious and often a chronic problem persists despite increasing educational opportunity. In order to gain additional knowledge of the likely correlates of underachievement, this study will explore the possibility of developing instruments which may discriminate between over- and underachievers at the high school level.

CHAPTER II

REVIEW OF RELATED RESEARCH

Much literature has been published on the correlates of achievement. An attempt is made here to select only those references which are relatively recent as well as relevant to the study.

EXTENT OF UNDERACHIEVEMENT IN SCHOOL

Research into the extent of underachievement has received much support in recent years. In the United States, it received particularly strong impetus after the Sputnik challenge in 1957, when it was suddenly realized that Americans could no longer afford to waste human potential. Numerous investigations into human resources management were initiated in the late 1950's and early 1960's. A summary of these can be found in Miller (1962). The most comprehensive and extensive of these surveys was the nationwide PROJECT TALENT which assessed the abilities and aspirations of 300,000 senior high school students (Flanagan, 1964). One of the more startling findings was that about 25% of those students who scored in the top quartile on academic aptitude tests did not attend college, and that 22% of those who did attend dropped out during the first year. Academic

failure was listed as the second most prominent reason (after financial difficulties) for not entering college, or for dropping out of it. Another large scale investigation, that of 4,900 bright high school students (New York City Board of Education, 1959) reported that 54% of the boys and 33% of the girls were achieving such low grades that their admissibility to college was in doubt. Other researchers concluded that between 20% and 50% of able students attending high schools, or colleges, achieved substantially below the level warranted by their ability (Coleman, 1965; Mathews, 1956; Miller, 1962; Wolfle, 1960).

CORRELATES OF UNDERACHIEVEMENT

The enormous waste of human resources due to under-achievement has stimulated numerous studies in the general area of correlates of underachievement. As Gibbs (1967) indicated, the commonly found correlates are environmental conditions and personality traits. Therefore, these are described in some detail below.

ENVIRONMENTAL VARIABLES

Environmental variables are the ones which are external to the person and seem to relate to, or influence his behavior. Examples of such variables could be socio-economic status, sibling order, parental and peer attitudes, or geographical surroundings.

It appears intuitively obvious that environmental variables might have a profound influence on a student's academic achievement. A poem by Gilburt (1960) may serve as an illustration.

ONE SULLEN BOY

His father, unmet and unknown,
The mother overworked and overwhelmed.
Six siblings, assorted ages and sizes,
Three dreary rooms, heat sporadic.

The baby brother but two years old,
Caught cold suddenly,
And more suddenly died!

For the teacher next morning, his story -
"I couldn't do my spelling last night."

There is universal agreement in research reporting family status as a correlate of underachievement.

Underachievers tend to come from culturally disadvantaged homes which are generally characterized by low income, poor housing, large number of children, and working mothers

(Hoehn, 1967; Kornrich, 1965; Tyszkowa, 1968).

Broken homes and family disruptions also tend to have a negative influence on achievement (Chabassol, 1959).

The education of the parents appears to play an important role. Underachievers tend to come from homes where the parents have less education than do the parents of overachievers. In addition, the underachievers' parents tend to be neutral or do not value education highly, the reverse being the case about parents of overachievers. (Brown and Dubois, 1964; Mackler & Giddings, 1965; Sewell & Shah, 1968).

Another universally reported factor concerns child-rearing practices. It appears that the parents of achievers generally show greater inclination to push their children toward achievement. They demand more, and expect mastery of many tasks at an earlier age than do the parents of underachievers (Crandall, et al, 1964; Freeberg, 1967; Winterbottom, 1958).

Ethnic origin is a factor which relates to achievement in multi-racial societies (Werner, et al, 1968; McClelland, et al, 1958; Rosen, 1959).

Also, religious affiliation has been established as a correlate of achievement (McClelland, 1961).

Since this study is mainly concerned with study habits and attitudes, an attempt was made to find references specifically applicable to the influence of school environment. In this connection, the study of Evans and Oswalt

(1968) is pertinent. They explored the influence of peer pressure on underachievers. They made early dismissal of classes contingent upon the performance of underachievers at the grade four and six level. The result was a marked increase in performance. Snyder (1969) found that the performance of underachieving college students improved simply by giving them special attention, e.g., inviting them to guest lectures and small group discussions. Similar results have been reported when underachievers were exposed to group counseling in the school (Beach, 1968; Berg, 1968; Kambly, 1967; Lenn, et al, 1967; Schaefer, 1968; Thelen & Harris, 1968).

In summary, the above research seems to indicate that achievement depends to a considerable extent upon the cultural background of the student, and the attitudes, values, and child rearing practices of his parents. Thus, the studies which indicate that most underachievers are chronic in nature seem to be corroborated by the relative stability of these factors during the underachiever's childhood and early adolescence.

PERSONALITY FACTORS

Personality characteristics of over- and underachievers have been the subject of wide and intensive investigation. The bulk of the studies on characteristics which differentiate between over- and underachievers has attempted to relate various personality traits, attitudes, and motivational levels to achievement. In reviewing this research, an attempt is made below to group these findings from general to specific characteristics.

SEX

There appears to be unanimous agreement that underachievement is predominantly a male phenomenon. The reported male to female ratio is about two to one. Studies which have explored this problem indicate that approximately half of all males who are above average in ability may be considered underachievers, while the corresponding figure for females is about 25% (Flanagan, 1964; Ford, 1957; Miller, 1962; N.Y. Board of Education, 1959).

In addition, there is some indication that chronic underachievement in males can be traced to the earliest grades, while females begin to demonstrate serious underachievement in late elementary or junior high grades (Shaw and McCuen, 1960).

TOTAL ADJUSTMENT

Results from the studies of total adjustment are conflicting, making it impossible to draw a clear conclusion. The difficulty seems to lie in the definition of what constitutes good and poor overall adjustment. The only conclusion warranted from this picture seems to be that the measures of maladjustment are not found consistently related to achievement (Goodman, 1968; Fair, 1959; Harris, 1968; Kisch, 1968; Ringness, 1965; Zunich, 1964).

A number of specific adjustment characteristics have, however, been reported with a fair degree of consistency. Thus, it has been found that underachievers tend toward conceptual rigidity, while overachievers tend toward flexibility (Davids, 1968).

Underachievers also seem to be less tolerant of ideational ambiguity (Keil & Sader, 1968); they are more negative in their attitude toward themselves, and in their evaluation of others. (Alves, 1960; Mason, 1958; Shaw, et al, 1960, 1964). They also seem to have stronger feelings of inferiority than overachievers do (Kurtz and Swenson, 1951).

Underachievers are also reported to possess irrational ideas to a greater extent than overachievers (Conklin, 1965), tend to rationalize their errors more (Shaw & Black, 1960), and set themselves goals which are either unrealistically high, or ridiculously low (Atkinson, 1968; Kurtz and Swenson, 1951; McKenzie, 1964). Additionally, they tend to

be less mature than their achieving peers (Altus, 1948; Burgess, 1956; Durr & Schmatz, 1964; Kisch, 1968). But, more importantly, they show need for immediate gratification (Eston, 1960; Middleton & Guthrie, 1959; Smith, 1965; Wellington & Wellington, 1965).

Lastly, there appears to be general agreement that underachievement tends to correlate with feelings of hostility (Chabassol, 1959; Corlis, 1963; McKenzie, 1964; Miller, 1962; Roberts, 1962).

SOCIAL ADJUSTMENT

The social behavior of underachievers has also been extensively studied. Again, there are occasionally conflicting findings. However, most researchers report that underachievers engage in social activities to a greater extent than do overachievers (Bishton, 1957; Kisch, 1968; Merrill & Murphy, 1959). This has often been interpreted to mean that time spent socially was time lost to studies (Middleton & Guthrie, 1959; Durr & Schmatz, 1964; Taylor, 1964).

However, more recent research has suggested that the reported extroversion of underachievers may represent an attempt to bolster their feelings of inferiority by gaining social acceptance (Kisch, 1968). This is supported by findings that underachievers depend more on others for their attitudes and values (Atkinson, 1968; Burgess, 1956; Chabassol, 1959; McKenzie, 1964) whereas overachievers

are more independent and self-sufficient (Bishton, 1957; Gough, 1953; Nash, 1963), and less in need of affection from others (Horrall, 1957).

Family relationships seem to be a major problem with underachievers. They tend to feel rejected by their parents, and their relationships with family members are often superficial and psychologically distant (Chabassol, 1959; Combs, 1965; Gowan & Demos, 1966; Zoolian, 1965).

TASK PERFORMANCE

In connection with the investigation of achievement motivation, the performance of both underachievers and overachievers on problem solving tasks has been examined. Dudek & Lester (1968) observed that underachievers appear to have patterns of cognitive development which are characterized by short attention span and concentration (low digit span). They discovered that in spite of well developed vocabulary and conceptual thinking, underachievers tend to be weak in areas which require sustained effort to do well. On tasks requiring the acquisition of specific skills, such as arithmetic, or rote learning of information (cramming), underachievers fare particularly poor (see also Atkinson, 1968).

STUDY HABITS

In connection with the investigation of study habits, Kisch (1968) reports that underachievers have difficulties with subordinating personal needs to demands for study and work. This finding is supported by those studies which report that the underachievers' greater immaturity is frequently demonstrated by a lack of self-discipline as manifested in their inability to complete unpleasant tasks (Miller, 1962). This is confirmed by Haywood (1968) who reports that overachievers tend to be motivated by factors inherent in the performance of the task, while underachievers tend to be motivated by factors extrinsic to the task, i.e., the ease, pleasure, safety, or comfort of doing the task. Hence, studying may often be a repugnant task to underachievers since it does not tend to be easy, pleasurable, or comforting.

It seems, however, that the mere mechanics of studying do not differentiate too well between over- and under-achievers, except for the amount of time spent in studying. Research into the mechanics of study skills revealed that both over- and underachievers often lack the most rudimentary knowledge of effective study methods (DeSena, 1964; Finger & Schlessner, 1965). These investigators suggest that attitude and motivation toward scholastic activities are more important determiners of achievement than knowledge of good study skills.

In summary, the available research appears to corroborate Kisch's (1968) classification of underachievers into three major types:

1. Those who attempt to compensate for feelings of inadequacy by adopting an extroverted, exhibitionistic stance. This group is impulsive, lacks self-discipline, and goes out for social interaction in preference to study.
2. Another type of underachiever is well motivated but usually socially isolated, angry, and alienated. This group's underachievement seems to be a product of mental rigidity, and adherence to irrational beliefs which inhibit new learning and generate many conflicts.
3. A third group seems to consist of well adjusted, social individuals whose low grades seem to be simply the result of weak interest in the particular subject matter, or relatively short term situational problems, rather than antagonism or impulsiveness.

METHODOLOGY OF RESEARCH IN UNDERACHIEVEMENT

Academic underachievement is usually defined in terms of expected achievement being much higher than actual achievement, the reverse being true about overachievement. Hence, in order to find out if a given student is over- or underachieving, one needs measures of academic achievement as well as scholastic ability. These two measures can then

be compared in an effort to find out whether a given student's achievement is what might be expected from his ability.

ACHIEVEMENT CRITERION

The most frequently used criterion of academic achievement has been the composite grade point average. It is supposed to provide the best overall index of actual performance. It minimizes such factors as dislike for a particular subject or teacher. It also obscures the difference in difficulty level of the courses by lumping all of them together. Since all students do not take the same courses, the grade point average of one student would not have the same meaning as that of another. Therefore, by using the GPA, one would be comparing non-comparable numbers.

As an alternative, scores on a single subject obtained on a common objective test can be used. This has the advantage of yielding a standardized measure for large enough populations. However, it furnishes achievement measures in a limited area only. One would naturally expect divergent results from the two approaches. This has been shown by several researchers (Miller, 1962; Rippert & Archer, 1963; Shaw & Brown, 1957).

ABILITY CRITERION

The measures of scholastic ability are generally derived from standardized scholastic aptitude tests. On the college level, studies on underachievement have usually relied on the American Council on Education Psychological Examination for College Freshmen (ACE), the School and College Ability Tests (SCAT) published by the Cooperative Test Division of the Educational Testing Service, the Scholastic Aptitude Test (SAT) prepared by the College Entrance Examination Board, and the Ohio State University Psychological Examination. Of these four, the ACE appears to be used most widely, the SCAT being a close second. At the high school level, the SCAT and the Lorge-Thorndike are used most widely. Below the high school level, a variety of intelligence tests are used.

It is interesting to note that the ACE, SCAT, and SAT yield comparable results. Correlations between the scores on these tests are usually above .8 (SCAT manual, p.19).

IDENTIFICATION OF UNDERACHIEVERS

Once measures of achievement and ability are available, one needs only to transform these to a common base for comparability. By far the most common transformation has been to convert both measures to standard scores (z-scores). Other transformations commonly used are T-scores, ranks, and percentiles.*

* One could also avoid transformation of scores by using linear regression.

Once these measures have been transformed to comparable scales, one only needs to fix the value of the difference between these measures to classify students as over- or underachievers. Again, various amounts of difference have been used. The most common one in connection with z-scores appears to be one standard unit (Gowan, 1957; O'Shea, 1968). However, as little as .5 standard unit has been used by some researchers, for example by Altus (1943) and Seaman (1960).

With T-scores, Charette (1968) used a minimum difference of eight points, while Diener (1960) used 15 points. When percentile ranks are used, the usual minimum difference score has been 25 percentile points (Shaw & Brown, 1957). Several studies have also used less rigorous methods of identifying underachievers (Coleman, 1960; Fair, 1959).

PSYCHOMETRIC DEVICES USED

Probably the most successful approach to identify correlates of underachievement has been the personal interview (Chabassol, 1959). Unfortunately, this is also the least economic, and thus it can not be used for large scale testing.

The next most successful technique has been the use of biographical inventories based largely upon environmental

conditions. These, when analyzed, tended to produce the environmental factors (Brown & Dubois, 1964; Carter and McGinnis, 1953; Ford, 1965; Malloy, 1954; McQuary, 1954).

In the area of personality variables it appears that a large number of psychological tests have been used, some more frequently than others. During the 1950's, the Minnesota Multiphase Personality Inventory (MMPI) seems to have been the favourite. During the 1960's, the Edwards Personal Preference Schedule (EPPS) gained in popularity, perhaps because it avoids the unpleasant connotations of abnormality which the names of the MMPI sub-scales suggest. While scores on the various sub-scales of both the inventories have been found to correlate significantly with underachievement, overall results of research have been largely inconsistent (Allen, 1957; Diener, 1960; O'Shea, 1968; Vaughan, 1967).

Other instruments used are the Bell Adjustment Inventory (Davidson, 1950) and the California Personality Inventory (Fair, 1959).

RESEARCH ON STUDY HABITS AND ATTITUDES

Educators often advance the theory that underachievers lack appropriate study skills. Hence, the relationship between academic achievement and study habits and attitudes has been widely investigated. The instruments most extensively used in this connection have been the Brown and

Holtzman Survey of Study Habits and Attitudes (SSHA), and the Minnesota Study Habits Blank (MSHB). Both of these inventories have sub-tests which purport to measure study skills as well as attitudes considered conducive to academic achievement. However, research has led to conflicting results. Ahman and Glock (1957) found the SSHA to be of no value in predicting academic achievement of either high school or college students. Similarly, Anderson and Kuntz (1959) found that the SSHA did not differentiate between probationary and non-probationary students. Brooks and Heston (1945), using their own list of study skills, found that good students violated 27% of the rules on study habits included in their list, while poor students violated 31% of them. They concluded that study habits were not related to grades. Lum (1960), using the SSHA, found no difference in study habits between over- and underachievers. However, she found that underachievers had a greater tendency to procrastinate, to rely on external pressure for completing assignments, and to be more critical of educational methods and philosophies than the achievers. Hence, she concluded that attitudes were more important than the mechanics of study.

Other researchers have found a significant relation between achievement and study habits. Correlations ranged from .25 to .66 (Brown, 1964; Brown & Dubois, 1964; Chapman, 1958; Frost, 1965; Martens, 1964). These studies

were conducted at various educational levels in high school and college.

Kerns (reviewed by Frost, 1965) reported that under-achievers blamed difficulties with study skills for their poor achievement. Centi (1965) found that underachievers tended to rationalize their poor work to be a result of insufficient interest. They blamed teachers and the school for failing to make their courses interesting. Some investigators found that underachievers were often unwilling to conform to the requirements of the educational institution, and that an accepting attitude toward these requirements was a factor in academic achievement (Brown, 1954; Demos, 1961; Goldberg, 1963; Rolands, 1961; Wellington and Wellington, 1965). Specifically, underachievers were reported to express (1) doubt about the value of an education, or of certain courses; (2) criticism of restrictive school regulations; (3) inability to relate to teachers, or other authority figures; (4) boredom with school activities; (5) the wish to drop out of school; (6) procrastination in doing assignments; and (7) dislike of reading.

High achievers, on the other hand, seemed to like their classes, accepted their teachers, spent more time doing optional reading, and crammed for exams (Gerberich, 1949). They also devoted more time to studying, used a sitting posture while reading, and preferred to study alone (Joshi and Chaudhari, 1967).

De Sena's (1964) comparison of the effectiveness of two study habits inventories (SSHA, and College Inventory of Academic Adjustment) revealed that the difference between the academically successful and failing students was mainly in the area of attitudes and motivation toward educational activities, rather than in the area of study skills alone, even though the two groups were different with respect to study habits. Finger and Schlessner (1965) concluded likewise that the predominant non-intellectual factors in academic success were attitudes concerning school.

Unfortunately, only Finger and Schlessner (1965) have relied on techniques of multivariate analysis to arrive at their conclusions. The other investigators used the scoring keys as provided by the authors of the various inventories. Thus, the results may not be comparable. As Brooks and Heston (1945) noted, the validity of attitudinal instruments also varied with the group tested, and particularly study habits and attitudes varied over time, as well as over geographical areas. Other investigators noted that these varied even from school to school in the same area (Brown, 1964; Brown & Dubois, 1964).

In addition, the conflicting results are probably compounded by the fact that the authors of both the SSHA and the MSHB relied primarily on interjudge agreement as the method for clustering the items into the study habits or attitudinal sub-scales. In the case of the SSHA, the items were scaled on the basis of majority agreement of

15 judges, whereas the MSHB was similarly scaled by two judges whose intuitive classification was later compared to that yielded by cluster analysis. However, the MSHB manual gives no information on the result of this comparison beyond a statement that "the intuitive analysis, and the cluster analysis were roughly parallel."

In the light of the above, the conflicting results of research which used the a priori sub-scales as a starting point are hardly surprising.

The general procedure which has been most widely used in related research seems to have been to collect a sample of underachievers and a sample of overachievers from the research population. The hypothesized differences were then measured in these samples, and tested for significance. The rationale for this approach has been that by selecting samples with a maximum achievement differential, relevant differences which contribute to this differential can be discovered more readily. Yet it appears that these simple designs have not been very fruitful and have led to divergent and often conflicting findings. This weakness may well be a result of scoring populations on a priori attitudinal clusters which may not be stable from one population to the next.

A CRITIQUE OF UNDERACHIEVEMENT RESEARCH

One could look at the whole area of research in the light of the comment of Rust (1958, p.46):

"Orientation in this field is particularly difficult because the literature presents a vast multiplicity of experimental variables, deals with all academic levels, and is characterized by a wide variation of experimental design."

In the light of such variation, the inconsistency in results is not too surprising. Several possible reasons for this are immediately apparent. One is the variation in the selection of over- and underachievers. Thus, a study which uses a minimum difference of one standard unit between ability and achievement may not be comparable to one which uses a minimum difference of only half as much.

It appears that the usual criterion for fixing the value of this difference is the researcher's desire to obtain reasonably large samples of over- and underachievers from the available research population, rather than a more objective specification of over- or underachievement (Charrette, 1968; Seaman, 1960). It is of interest to note in this connection that if a large enough research population is used, the difference score between ability and achievement approaches the normal distribution. For example, by using as criterion a minimum difference of one standard unit between the achievement and ability scores of 920 students, O'Shea (1968) classified 144 as underachievers, and 140 as over-achievers, whereas the expected proportion under the normal

curve would have been 145 students in either group. Thus, the differential measures which are given in terms of a standard transformation permit a good estimate of the proportion of over- and underachievers which are so being classified in the research population. This indicates that studies which have used a .5 differential measure have defined about one-third of their population as under- and overachievers respectively, leaving only a third of the total population in the normally achieving category. It appears that in view of the relative imprecise nature of the psychometric devices used, this may be one of the principal reasons for the contradictory findings from research on underachievement.

The achievement criterion could also be source of conflicting findings, particularly because it is known that standardized achievement test scores are not comparable with teachers' grades for the purpose of identifying over- or underachievers.

Next, the nature of the research population should also be considered. Factors which correlate significantly with underachievement among female college students may not do so in the case of underachieving high school boys.

Also, the methods of identifying correlates of underachievement deserve a critical look. In many researches, hypotheses about the correlates were accepted or rejected on the basis of scores from published study habits and attitudes inventories. As has been pointed out, sub-

scales on these inventories are often based on subjective interjudge agreements. Such sub-scales tend to be highly intercorrelated, rather than independent. Hence, scores on these sub-scales could be poor estimates of whatever the scales purport to measure. In addition, the sub-scores are frequently combined into a total score for the purpose of correlation with an achievement index. The result is a correlation of an averaged measure of various study habits and attitudes with an achievement average composed of grades from non-comparable courses. Hence, the generally low correlations between such averages are hardly surprising.

In order to improve research results, it appears that a fruitful approach at this time might be to increase the rigor of defining underachievement. Thus, it is suggested that the minimum acceptable difference between ability and achievement measures should be one standard unit. It would appear that the more extreme the discrepancy, the more deviant the behavior, the greater the opportunity for identifying the correlates of such behavior.

In addition, the most important improvement might be in terms of the application of more sophisticated psychometric techniques. With the assistance of computers, multivariate techniques such as cluster analysis can now be routinely applied to large scale data. This makes it possible to derive attitudinal clusters of relatively high reliability directly from the research population, rather than having to rely on subjective interjudge agreement.

In summary, it appears that the inconsistent results found in underachievement research are primarily due to a lack of generally accepted operational definitions. More importantly, however, the research methodology needs improvement, particularly in the area of using advanced psychometrics for analysing the data.

CHAPTER III

THE DESIGN AND PROCEDURES

The objectives of the present research were primarily methodological. They can be considered in two classes:

- (a) whether it is possible to extract psychologically meaningful and psychometrically reliable clusters of items from an attitudinal inventory by using multivariate techniques of analysis,
- (b) whether the clusters so extracted help in the identification of correlates of underachievement.

If psychometrics can help in extracting homogeneous and independent clusters of items from an inventory, reliance on the subjective method of interjudge agreement as a basis for developing sub-scales will not remain necessary. Since it is known that scales developed on the basis of interjudge agreement are usually highly correlated, the benefit of applying psychometrics would be in developing more independent sub-scales.

SOME BASIC ASSUMPTIONS

The present research assumes that the academic achievement of a student is related to many variables and can be considered in terms of the model of Gibbs (1967):

$$\text{Academic Performance} =$$
$$\text{Personality Factors} + \text{Environmental Factors}$$

This research will be limited to exploring non-cognitive factors. As such, it will consider personality factors other than ability, and possibly some environmental factors pertaining to study habits.

The term 'Personality Factors' could include:

- (a) ability (intelligence),
- (b) study habits,
- (c) attitudes.

It is assumed that in a given individual a, b, and c are measurable. It is further assumed that a, b, and c are related to the academic performance of a given individual. The extent of the influence of each of these factors would, of course, vary from person to person. The above assumptions are supported by the fact that correlations between ability and achievement are much below unity, suggesting thereby the influence of non-ability factors. While it would be possible to predict achievement of some students largely from their ability, for others, non-ability factors may be very potent predictors of achievement.

The focus of interest in this investigation is on variables b and c above. In order to find non-ability factors which correlate with achievement, the research will be based upon samples of over- and underachievers. It seems that in such samples the non-ability factors would be more influential than ability in determining achievement. Hence, such samples would provide the maximum opportunity for finding non-ability factors.

THE INSTRUMENTS USED

It was not deemed feasible to extend the scope of this study so as to include the construction and validation of a new instrument for the measurement of the above factors. Rather, as a step in the direction of gaining some insight into these factors, and their reliability, it was decided to analyze an available inventory of study habits and attitudes with a view to extracting reliable and independent clusters of items which may then be considered as correlates of underachievement.

The inventory selected for this purpose was the Brown & Holtzman Survey of Study Habits and Attitudes (SSHA).

THE SSHA

The aim of the authors of the SSHA was to construct a scale to measure non-cognitive variables considered important in scholastic achievement. The SSHA, therefore, appeared promising for this study since it claims to contain factors which may discriminate between over- and under-achievers.

The SSHA is a 100 item inventory. Two forms are published: Form C and H. These are intended for college and high school use respectively. The items in the two forms are highly similar except for the wording of certain items. (Form H is given in Appendix A.)

As a biographical instrument, the SSHA provides the student with a systematic way of indicating some of his attitudes towards, and practices regarding school work by responding to each statement on a 5 point scale. The student indicates whether a given statement applies to him 'rarely', 'sometimes', 'frequently', 'generally', or 'almost always'.

The items were primarily derived by the authors Brown and Holtzman from group interviews and existing inventories on the basis of the items being able to differentiate between good and poor students. They were subsequently classified a priori ,that is, subjectively into four sub-scales of 25 items each. These sub-scales are intended to indicate the extent of

- (a) Delay Avoidance,
- (b) Work Methods,
- (c) Teacher Approval,
- (d) Educational Acceptance.

The reasons for using the SSHA in this study are several. Some of them are:

- (1) A sizeable amount of research has been done on the SSHA, in which the instrument's correlation with academic achievement ranged from .1 to .6, with a median of about .3.
- (2) Its correlation with various measures of scholastic aptitude is low enough to indicate that the predictive power of the SSHA rests on its measurement of traits largely untouched by ability measures (Brown & Holtzman, 1956, p.5).
- (3) The rationale used for developing the inventory:

The fact that some students with apparently high scholastic aptitude do very poorly in school (under-achievers)* while others with only mediocre ability do well (overachievers)* has presented a challenge to many educators. The SSHA was developed to help meet this challenge (Brown & Holtzman, 1956, p.5).
- (4) The SSHA is an easily administered measure of study habits, motivation for studying, and attitudes toward scholastic activities which are important in the classroom.
- (5) The items of the SSHA were classified a priori and subjectively into four sub-scales. Hence, a statistical validation of this classification scheme appeared desirable.

* Brackets added.

Deese, in his review of the inventory in Buros (1965, p. 689) concluded that

This inventory or survey is a unique and valuable contribution to the techniques for assessing student habits of work and motivation for study. It is more suited for uncovering attitudinal and motivational difficulties than any other published study inventory, and its use is particularly recommended when such difficulties are the prime concern.

From the preceeding it appears that the SSHA was specifically developed to measure non-ability traits. Hence, it was decided to use it in this research.

THE SCHOOL AND COLLEGE ABILITY TEST (SCAT)

Each year in December, the Department of Education, Province of Alberta, administers the SCAT (Form 2A) to all the grade XII students. The scores on the SCAT can, therefore, provide measures of scholastic ability for all but those few who missed the school on the day of administering the SCAT.

The SCAT is composed of four sub-tests which, according to the Cooperative Division, Educational Testing Service, are designed to aid in estimating the capacity of a student to undertake the next higher level of schooling. They involve comprehending the "sense" of a sentence read (Part I), attaching meaning to isolated words (Part III), manipulating numbers and applying number concepts (Part II), and solving quantitative problems (Part IV).

The test yields three scores - verbal, quantitative,

and total. However, the relative weight of the two sub-scores is not equal - the verbal score playing a greater part in determining rank order on the total score.

Since the SCAT is intended primarily as a measure of a student's ability to succeed in future academic work, its predictive validity is of primary importance. The publisher gives correlations of fall SCAT scores with end-of-year average marks of grade XII students ranging from .45 to .56. The reliability of the test as determined by the Kuder-Richardson Formula 20 is .95.

One of the principal objectives in the development of the SCAT was that the test should measure "school learned abilities", rather than psychological characteristics or traits which may afford some indirect measure of capacity for school learning. This objective was accomplished by including items which appear to be critical pre-requisites to subsequent steps in learning throughout the range of general education. Therefore, while the test can not be truly considered one of intelligence, it does appear to be an adequate predictor of a student's ability to handle academic work, and can, therefore, be called a test of scholastic ability with some justification.

In his review of the test, Russel (in Buros, 1965) makes the following appraisal:

The SCAT series can be confidently regarded as a set of very good scholastic aptitude tests which probably is in most ways the equal of any of its competitors....

If one is primarily concerned with prediction of general overall levels of future performance, SCAT can clearly be recommended for use

Or if one wishes to install a system which will focus on academic aptitude while at the same time avoiding the use of IQ labels, then SCAT appears to be ready made for him.

Hence, it was decided to use the readily available scores on the SCAT for measuring scholastic ability, rather than administer some other test for this purpose.

THE DEPARTMENTAL EXAMINATION IN MATHEMATICS 30 (MATH 30)

Under the semester system which is in operation in most high schools in Alberta, students can write the departmental matriculation examinations at the end of each semester, that is, in January, and June.

Since students in Alberta high schools are generally taking a highly individualized program of studies, it was not possible to obtain a reliable achievement measure through a composite mark derived from several subjects. It was therefore decided to use the mark obtained on a single subject only. The choice fell on Math 30 which is not only a popular matriculation subject, but is also likely to yield the most reliable scores.

In addition, there is evidence (Dudek & Lester, 1968; Kisch, 1968) that a good grade in Mathematics requires greater orientation toward achievement than other popular subjects, such as English, or Social Studies. Therefore, Math 30 seemed to be the best choice.

The aim of the Math 30 examination is to test a student's skill in solving arithmetic problems. It is a three hour power test. It generally consists of about 50 to 60 problems of varying difficulty, covering the entire subject matter taught in the Math 30 course.

THE POPULATION

The population of students for this research consisted of the students of the Province of Alberta who met each of the following criteria:

- (1) They were full time day students enrolled in a publicly supported high school in the Province of Alberta.
- (2) They wrote the School and College Ability Test (SCAT) in December 1968.
- (3) They wrote the Alberta Department of Education examination in Mathematics 30 in January 1969.

There were 3137 students in this population. It consists mostly of those who aspire to continue their education at the post-secondary level. Thus, failure due to underachievement would be particularly detrimental to these aspirations.

Assuming that the nature of the population does not change from year to year in regard to the variables relevant to this study, one could consider these 3137 students as a sample from the total population during recent years.

DEFINITION OF UNDER- AND OVERACHIEVEMENT

In order to make the Math 30 scores and the SCAT scores comparable, these measures were transformed linearly to standard scores for all the 3137 students. Then, the incidence of under- and overachievement was determined by plotting the differences between these standard scores. It was found that the difference scores formed a nearly normal distribution. Thus, the proportions under the normal curve could be used to estimate the size of under- and overachieving groups of students for different values of the "difference scores". Table I summarizes the more popular difference scores used by past researchers.

In keeping with the earlier recommendation of a more stringent definition of over- and underachievement, a minimum difference score of 1.5 standard units between the SCAT and Math 30 score was adopted as the criterion for classifying over- and underachievers. Applying this definition to the Math 30 sample gave 251 overachievers, and 212 underachievers - about seven percent of the total in each of the groups.

It should be noted that a difference score of more than 1.5 standard units is a much more rigorous definition of over- and underachievement than that used by most of the other investigators.

TABLE I

SIZES OF OVER- AND UNDERACHIEVING GROUPS
USING VARIOUS DIFFERENCE SCORES

DIFFERENTIAL IN STD. DEV.	OVER ACHIEVERS	NORMAL ACHIEVERS	UNDER ACHIEVERS
> 0.5	1022 32.6 %	1192 38.0 %	923 29.4 %
> 1.0	553 17.6 %	2113 67.4 %	471 15.0 %
> 1.5	251 8.0 %	2673 85.2 %	212 6.8 %
> 2.0	96 3.1 %	2972 94.7 %	69 2.2 %

SOME DESCRIPTIVE STATISTICS OF THE SELECTED GROUPS

The two groups were classified by sex, and by rural-urban background. It was decided to classify those students as urban who live in centres of more than 20,000 population. The result is given in Table II which shows that the urban underachievers conform to the 2 to 1 sex ratio found by other investigators (Flanagan, 1964; Miller, 1962; N.Y. Board of Education, 1959). However, this ratio approaches 1 to 1 among the rural underachievers. It appears that such a discrepancy has not previously been noted; this might be due to the fact that the populations used by other investigators have usually been urban only.

TABLE II

OVER- AND UNDERACHIEVERS
CLASSIFIED BY SEX AND BY SIZE OF COMMUNITY

UNDERACHIEVERS				OVERACHIEVERS				
RURAL		URBAN		RURAL		URBAN		
M	F	M	F	M	F	M	F	
46	46	80	42	70	63	64	52	463

The population ratio, using the above definition of urban versus rural, is about equal in Alberta. Hence, one would expect an equal number of urban versus rural over- and underachievers. Note, however, that there are fewer rural than urban underachievers, but more rural than urban overachievers in the respective groups. There might be various reasons for this, for example:

1. The SCAT may be favouring the culturally more exposed urban student.
2. Differences in values and achievement orientation may exist between rural and urban students.

Next, the groups were analyzed in terms of failure to meet the achievement standard for matriculation standing in the Math 30 final examination. The results are given in Table III which indicates the tragedy of underachievement, since it shows that almost half of the underachievers did not meet matriculation standards in spite of a mean ability score which is more than two standard deviations higher ($1.12 + .90 = 2.02$) than the mean of the overachieving group in which not a single student failed.

TABLE III
PROPORTION OF FAILURES
IN THE OVER- AND UNDERACHIEVING GROUPS

	TOTAL POPULATION	UNDER ACHIEVERS	OVER ACHIEVERS
Total	3137	212	251
Passed	2698 (86%)	114 (54%)	251 (100%)
Failed	439 (14%)	98 (46%)	NIL (0 %)
Mean SCAT (in z-scores)	0.00	1.12	-0.90

STATEMENT OF HYPOTHESES

The hypotheses which were tested in this study were:

Research Hypothesis I

Does a multivariate analysis of the SSHA by means of the 'method of homogeneous keying' as outlined by Dubois, Loevinger, and Gleser (1952), but conceptualized by Loevinger (1947), yield clusters of items having higher reliability as measured by the Kuder-Richardson Formula 20, than the a priori clusters of the SSHA? (The method will be called 'cluster analysis' for the sake of convenience.)

Research Hypothesis II

Do scores obtained from a posteriori clusters improve differentiation between over- and underachievers, in comparison to the scores based upon the a priori SSHA clusters?

Research Hypothesis III

Are the a posteriori clusters more independent (less correlated) than the a priori clusters?

Research Hypothesis IV

Are the a posteriori scales better predictors of achievement than the a priori scales?

COLLECTION OF DATA

According to the definition of under- and overachievement adopted here, those students whose z-scores on the SCAT test and the Math 30 achievement test differed by more than 1.5 were identified. This procedure gave 251 overachievers, and 212 underachievers from the sample of 3137 students.

The Brown & Holtzman questionnaire (Form H) was then mailed to the selected students, together with a letter soliciting their co-operation in answering the questionnaire. Ten days after the first mailing, a reminder was mailed. A specimen of the mailings is included in Appendix A.

Of the 463 questionnaires mailed out, 411 (89%) were obtained back, duly completed. In 22 of these, one or two items had been left unanswered. Since there appeared to be no systematic tendency to omit a particular item, it was assumed that these were oversights. A score of '3' was assigned to these items. This had the effect of the items being ignored by the scoring key.

The 411 usable questionnaires consisted of 229 from overachievers, and 182 from underachievers. The remaining 52 questionnaires consisted of six which were returned undelivered, 21 not returned by overachievers, and 25 not returned by underachievers.

CHAPTER IV

ANALYSIS OF DATA AND RESULTS

Hypothesis I

In order to test Hypothesis I, namely, that cluster analysis will yield clusters which are as reliable as the a priori clusters of the SSHA, the following procedure was adopted:

The responses to the questionnaire were scored by assigning weights to the alternatives of each item. Take this as an example: "I give special attention to neatness on themes, reports, and other work to be turned in". The student may answer it under a, b, c, d, or e, depending upon whether it applies to him 'rarely', 'sometimes', 'frequently', 'generally', or 'almost always' respectively. These responses were assigned weights of 1, 2, 3, 4, or 5. The obtained response matrix yielded a correlation matrix which was then analyzed by the method of "homogeneous keying" of Dubois, Loevinger, and Gleser (1952).

This method treats the data in the following manner:

1. A variance-covariance matrix is calculated which contains all item variances, and the covariance of each item with every other item.
2. Using the Kuder-Richardson Formula 20 (KR20), three items showing the highest homogeneity are identified. They are used as a starting point for developing a cluster.

3. Subsequently, one item at a time is added to this cluster in such a fashion that the added item increases the reliability of the cluster maximally.
4. If none of the remaining items increases the reliability of the cluster, the cluster is closed. The procedure is then repeated using the remaining items for developing a second cluster. The iterative process is continued until the clusters identified show poor reliability.

This method identifies clusters of items such that each cluster has maximum reliability or internal consistency. As Gupta (1968a,b) has shown, the clusters developed by this method are almost identical to the factors found by means of principal axis factoring, followed by varimax rotation.

The reliability coefficient was then calculated for each cluster developed by the above method, as well as for each a priori SSHA cluster, using the internal-consistency method of Kuder-Richardson (1937). Because these reliability coefficients are partly a function of the cluster length, coefficients calculated from clusters of differing length are not directly comparable. Therefore, the coefficients of the a posteriori clusters were adjusted to the 25 item length of the a priori clusters by means of the Spearman-Brown prophecy formula for estimating the reliability of tests of different length (see Winer, 1962, p. 127).

The two sets of clusters were then ordered by the size of their reliability coefficients, and the four a priori cluster coefficients were compared with the similarly ranked a posteriori cluster coefficients. As can be seen from Table IV, the adjusted coefficients of the a posteriori clusters are higher than each of their correspondingly ranked a priori cluster coefficients. Hence, it is concluded that the cluster analysis produces more reliable clusters than the a priori subjective classification.

TABLE IV

RELIABILITY COEFFICIENTS OF THE A PRIORI
AND THE A POSTERIORI SSHA CLUSTERS

A PRIORI CLUSTERS	NUMBER OF ITEMS	KR20	
Delay Avoidance	25	.906	
Educational Acceptance	25	.891	
Work Methods	25	.824	
Teacher Approval	25	.813	
	<u>100</u>		
A POSTERIORI CLUSTERS	NUMBER OF ITEMS	KR20	ADJUSTED FOR 25 ITEMS
2	5	.824	.959
1	14	.915	.951
3	19	.885	.910
4	31	.873	.847
	<u>69</u>		

The Spearman-Brown prophecy formula can be used to compare the efficiency of the two methods of clustering. Knowing the reliability of an a priori cluster, one can estimate the number of items required to produce a reliability equal to that of the a posteriori cluster. The ratio of the two sizes of the clusters can then be taken as a measure of the efficiency of the two methods of clustering. The results are shown in Table V.

TABLE V

COMPARISON OF THE CLUSTER SIZES NEEDED FOR A GIVEN KR20
USING A PRIORI AND A POSTERIORI CLUSTERING TECHNIQUES

(1) A PRIORI CLUSTERS	(2) ACTUAL KR20	(3) DESIRED KR20	(4) NO.OF ITEMS NEEDED FOR (3)	(5) NO. OF ACTUAL A POSTERIORI CLUSTER ITEMS
D.A.	.906	.824	13	5
E.A.	.891	.915	33	14
W.M.	.824	.885	41	19
T.A.	.813	.873	<u>40</u>	<u>31</u>
			127	69

As can be seen, the a priori clusters would need to contain a total of 127 items to achieve the same reliability as the 69 items of the a posteriori clusters. The efficiency of a priori clustering is thus only 54% of that of the other technique.

Hypothesis II

Hypothesis II was that a posteriori and a priori scales differentiate equally well between over- and underachievers. It was tested as follows: Two independent random samples were taken - one sample to develop the clusters based on multivariate analysis, and a second sample to find out if the scores from the clusters so developed yield improved differentiation between the over- and underachievers in comparison to the a priori clusters.

To test the above hypothesis, both the over- and underachieving groups were randomly divided into two equal halves. The first half, consisting of 115 overachievers and 91 underachievers was called sample A, the second half, consisting of 114 overachievers and 91 underachievers was called sample B.

The responses of sample A were subjected to the multivariate analysis in three ways:

1. Clusters were developed using the responses of all 115 over- and 91 underachievers. These were labeled total clusters.

2. Clusters were developed using the responses of the 115 overachievers only. These were called overachiever clusters.
3. Clusters were developed using the responses of the 91 underachievers only. These were termed underachiever clusters.

Each subject in sample B was then scored on the four most reliable clusters produced by each of the above methods. He was also scored on the a priori SSHA clusters. Scoring was based on the key developed by Brown & Holtzman.

The resulting cluster scores were analyzed using Hotelling's T^2 test for the equality of k means (see Winer, 1962, p.632). The results are shown in Table VI.

As can be seen, both the a priori and the a posteriori clusters differentiate well between the over- and under-achievers, with the a posteriori total clusters having the highest F-ratio. Therefore, it is concluded that a posteriori clusters differentiate between over- and underachievers at least as well as do the a priori clusters.

It should be noted, however, that the a posteriori clusters have, on an average, only about half as many items as the a priori clusters. Hence, their advantage is in increased efficiency: their use would save time and effort, without any loss of discriminative power.

TABLE VI

SUMMARY OF APPLYING HOTELLING'S T^2 TEST
TO THE FIRST FOUR CLUSTERS IN EACH METHOD

CLUSTER	NO.OF ITEMS	OA MEAN	UA MEAN	F-RATIO	P
SSHA DA	25	20.34	15.59		
SSHA WM	25	22.47	24.97		
SSHA TA	25	27.24	24.98		
SSHA EA	<u>25</u>	25.83	20.86	12.699	0.00000
	100				
TOTAL CL. 1	5	5.62	4.44		
TOTAL CL. 2	35	31.71	22.55		
TOTAL CL. 3	7	6.46	7.37		
TOTAL CL. 4	<u>3</u>	2.15	3.18	18.043	0.00000
	50				
OA CL. 1	5	5.62	4.44		
OA CL. 2	4	3.60	2.42		
OA CL. 3	10	10.29	7.69		
OA CL. 4	<u>4</u>	3.63	4.22	9.764	0.00000
	23				
UA CL. 1	4	4.07	2.93		
UA CL. 2	22	19.83	18.58		
UA CL. 3	3	3.11	2.14		
UA CL. 4	<u>27</u>	28.99	28.02	10.81	0.00000
	56				

Hypothesis III

Hypothesis III was: a posteriori clusters are as interdependent as a priori clusters.

To test the hypothesis, cluster inter-correlations were calculated among the cluster scores of sample B. The results are presented in Table VII.

TABLE VII

INTERCORRELATIONS AMONG A PRIORI AND A POSTERIORI CLUSTERS

		1	2	3	4
SSHA DA	1	---	.435	.412	.687
SSHA WM	2		---	.399	.368
SSHA TA	3			---	.650
SSHA EA	4				---
TOTAL CL	1	---	.404	.261	.141
TOTAL CL	2		---	.267	.161
TOTAL CL	3			---	.341
TOTAL CL	4				---

To obtain an estimate of the significance of the difference between the two sets of intercorrelations, an average correlation coefficient was obtained for each set by converting the entries in the table to their Fisher's z-function, averaging the values for each set of correlations

and testing the two averages for significance. The resulting z-score of 2.00 has an associated (one-tailed) probability of .0228. Therefore, it is concluded that the a posteriori clusters are more independent than the a priori clusters.

Hypothesis IV

Hypothesis IV was: the a posteriori clusters predict achievement as well as the a priori clusters.

One way to look at the usefulness of an inventory such as the SSHA is in terms of its ability to predict achievement. Hence, the a priori and a posteriori cluster scores were used in calculating stepwise linear regression equations to predict the achievement score of the students in sample B. Table VIII shows the clusters in the order of their relative contribution, as well as the cumulative percentage of the variance among the achievement scores which can be accounted for by including the respective cluster score in the prediction equation.

As can be seen, the a posteriori cluster scores account for 30% of the variance among the achievement scores, while the a priori clusters account for only 20%. However, a test of significance of the associated correlation coefficients showed that this difference is not significant ($z = 0.95$). Therefore, it is concluded that the a posteriori clusters are as effective in predicting achievement as the a priori clusters.

TABLE VIII

PREDICTION OF ACHIEVEMENT
FROM A PRIORI AND A POSTERIORI CLUSTER SCORES
USING STEPWISE MULTIPLE LINEAR REGRESSION

CLUSTER	% OF VARIANCE ACCOUNTED FOR	CUMULATIVE NO. OF ITEMS
SSHA EDUC. ACCEPTANCE	18.11	25
SSHA WORK METHODS	19.47	50
SSHA DELAY AVOIDANCE	20.56	75
SSHA TEACHER APPROVAL	20.61	100
TOTAL CLUSTER NO. 2	15.81	35
TOTAL CLUSTER NO. 10	22.81	38
TOTAL CLUSTER NO. 4	26.87	41
TOTAL CLUSTER NO. 1	28.30	46
TOTAL CLUSTER NO. 7	29.38	55
TOTAL CLUSTER NO. 5	29.77	77
TOTAL CLUSTER NO. 3	30.23	84
TOTAL CLUSTER NO. 8	30.56	89
TOTAL CLUSTER NO. 6	30.78	92
TOTAL CLUSTER NO. 9	30.78	97

Note, however, that the 38 items of the a posteriori clusters number 2 and 10 account for a greater percentage of the variance among the achievement scores than the 100 items of the a priori clusters. Thus, the a posteriori clusters are again shown to be more efficient than the a priori clusters.

CONTENT EXAMINATION OF THE A POSTERIORI CLUSTERS

The results of cluster analysis would be of greater practical value if the clusters could be interpreted in a psychologically meaningful sense, and acquire a certain construct validity. Hence, an attempt has been made below to interpret the meaning of the a posteriori clusters.

The items composing each cluster are presented in the sequence of their relative contribution to the reliability of the cluster. In addition, each student was scored on these clusters, and a mean score was calculated for the over- and underachievers. As an estimate of the significance of the difference between these means, a t-test and its associated probability were calculated.

Examination of the Total ClustersItems in Total Cluster Number 1 :

19. I think that teachers like to show who's boss too much.
39. I feel that teachers are too strict and know-it-all in dealing with students.
23. I feel that teachers are too narrow-minded and set in their ways.
3. I feel that teachers don't understand the needs and interests of students.
43. I believe that teachers secretly enjoy giving their students a "hard time."

According to the SSHA manual, the scoring key scores the items of the inventory in the manner in which good students tend to respond. This key scores all of the items

in this cluster on the 'rarely' end of the answer scale. When this key was applied to the responses of sample B, the following means resulted for the over- and under-achievers of sample B:

Overachievers' mean on total cluster 1 = 5.62
 Underachievers' mean on total cluster 1 = 4.44
 KR 20 for this cluster = 0.85; T= 3.29; P= 0.0012
 Adjusted for 25 items = 0.97

Thus, while most students answered these five items in the 'rarely' to 'sometimes' category, the overachievers felt that the items applied to them less frequently than the underachievers.

A quick glance at the items shows that they all describe how the students perceive certain personality characteristics of their teachers. Furthermore, the items describe only what are generally considered to be negative personality characteristics of teachers. Thus, the difference in the mean response between the over- and underachievers indicates that the underachievers tend to attribute these negative characteristics to their teachers to a greater degree than do overachievers.

Items in Total Cluster Number 2 :

Whereas the plurality of the SSHA items are scored on the 'rarely' end of the scale, some are scored on the 'almost always' end. Where this is the case, it is indicated here by affixing the letters 'AA' below the item number.

The items in this cluster are primarily concerned with study habits, and with attitudes toward school and education.

A closer look shows that they may be grouped into four related categories. These categories have been indicated by the broken lines. It should be noted, however, that these lines are only visual aids, and that the cluster as a whole should be considered as a unit.

1. When my assigned homework is extra long or unusually hard, I either quit or study only the easier parts of the lesson.
13. Even though an assignment is dull and boring,
AA I stick to it until it is completed.
12. Even though I don't like a subject, I still work
AA hard to make a good grade.
73. I complete my homework assignments on time.
AA
72. I try to become really interested in every subject
AA I take.
89. I keep my assignments up to date by doing my
AA work regularly from day to day.

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81. With me, studying is sort of hit-or-miss depending on the mood I'm in.
 49. When I sit down to study I find myself too tired, bored, or sleepy to study well.
 40. Some of my school work is so uninteresting that I have to make myself do the assignments.
 16. I lose interest in my studies after the first few days of school.
 41. I am unable to study well because I get restless, moody, or have the blues.
 60. Some of my classes are so boring that I spend the class period drawing pictures, writing notes, or daydreaming instead of listening to the teacher.
 44. I believe that having a good time and getting one's full share of fun out of life is more important than studying.

- 55. The illustrations, examples, and explanations given by my teachers are dull and hard to understand.
- 37. It takes a long time for me to get warmed up to the job of studying.
- 57. My studying at home is done in an easy-going, unplanned manner.
- 96. I feel like skipping school whenever there is something I'd rather do.
- 53. I waste too much time talking, watching TV, listening to the radio, going to the movies, etc., for the good of my studies.
- 32. Unless I really like a subject, I believe in doing only enough to get a passing grade.

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- 90. If time is left, I take a few minutes to check
AA over my answers before turning in my test.
paper.
 - 9. Daydreaming distracts my attention from my lessons while I am studying.
 - 17. I keep my work for each subject together and
AA carefully arranged in some planned order.
 - 5. If I have to be absent from class, I make up
AA missed lessons without being reminded by the teacher.
 - 25. I do not bother to correct errors on the papers my teachers have graded and returned to me.
 - 14. I give special attention to neatness or themes,
AA reports, and other work to be turned in.
 - 85. I study an hour or more each day outside of
AA school.
 - 45. I put off doing written assignments until the last minute.
 - 7. My teachers make their subjects interesting and
AA meaningful to me.

70. I copy the diagrams, drawings, tables, and other illustrations that the teacher puts on the black-board.
97. At the beginning of a study period I plan my
AA work so that I will make best use of my time.
29. My place of study at home is kept neat and
AA businesslike.

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10. My teachers criticize my written work for being poorly planned or hurriedly written.
61. Having too many other things to do causes me to get behind in my school work.
78. When getting ready for a test I arrange facts
AA to be learned in some planned order - order of importance, order in which taught, order of time in history, etc.
28. Lack of interest in my school work makes it hard for me to keep my attention on my reading assignments.

The following means were calculated for this cluster:

Overachievers' mean on total cluster 2	=	31.71
Underachievers' mean on total cluster 2	=	22.55
KR 20 for this cluster	=	0.94; T= 4.86; P= 0.000002
Adjusted for 25 items	=	0.92

These means indicate that overachievers have a greater tendency to answer 'almost always' to the items marked 'AA', and 'rarely' to the items not so marked than do under-achievers.

The four subdivisions of this cluster are all concerned with study habits, and with attitudes toward school and education.

The first category is made up of six items which are strictly concerned with study habits. A high score on these items would indicate a certain amount of self-discipline in

doing home work in spite of some implication of unpleasantness, while a low score would tend to show considerable reluctance about doing the home work.

The next thirteen items might be considered a second category in this cluster. Here, we find items on which a low score would indicate a lot of weariness concerning school life. The words 'boring', 'dull', and 'uninteresting' appear frequently in connection with class activities. There is some indication that students who feel that these items apply to them would rather do something else than come to school.

The next twelve items are again concerned with the mechanics of studying. The emphasis here seems to be on doing a thorough job, being neat, planning the work, and on avoiding distractions.

The final four items have a connotation which implies lack of time for school work, perhaps because of other interests, such as part time work, or similar activities.

In summary, the items in this cluster may be regarded as related to the degree of interest which a student shows in learning, and the amount of effort which he is willing to direct toward learning. From the difference in the mean scores, one may conclude that underachievers tend to show less interest in education, and are less inclined to put forth the required effort than are overachievers.

Items in Total Cluster Number 3 :

- 38. I do poorly on tests because I find it hard to think clearly and plan my work within a short period of time.
- 6. I have trouble saying what I want to say on tests, reports, and other work to be turned in.
- 50. I find it hard to pick out the important points of a reading assignment - points that later appear on tests.
- 46. After reading several pages of an assignment, I am unable to remember what I have just read.
- 98. During tests I forget names, dates, formulas, and other details that I really do know.
- 62. I seem to get very little done for the amount of time I spend studying.
- 63. I feel that teachers make their subjects too hard for the average student.

The following means were calculated from this cluster:

Overachievers' mean on total cluster 3 = 6.47
 Underachievers' mean on total cluster 3 = 7.37
 KR 20 for this cluster = 0.79; T= -1.99; P= 0.048
 Adjusted for 25 items = 0.93

All the items in this cluster are scored on the 'rarely' end of the scale. Hence, the means indicate that the under-achievers tend to exhibit the attitudes expressed in this cluster somewhat more rarely than do the overachievers. The feelings expressed appear to centre around anxieties concerning academic performance. There is an indication of anxiety about not being able to remember, or to think clearly. However, the small difference between the above means indicates little more than a trend that overachievers may be more anxious than underachievers about their performance in school.

Items in Total Cluster Number 4 :

- 30. I have trouble with spelling, grammar, and punctuation while writing themes and reports.
- 82. I am careless about spelling, punctuation, and grammar when answering test questions.
- 94. When tests are returned, I find that my grade has been lowered by careless mistakes.

The means of this cluster are:

Overachievers' mean on total cluster 4 = 1.15
 Underachievers' mean on total cluster 4 = 3.18
 KR 20 for this cluster = 0.69; T=-4.31; P= 0.000027
 Adjusted for 25 items = 0.95

The underlying theme of these three items is quite well summarizes in item No. 82. The cluster seems to express carelessness about, and perhaps some difficulties with the mechanics of punctuation. Surprisingly, however, under-achievers consider this to be their problem more rarely than do overachievers.

Items in Total Cluster Number 5 :

- 15. I believe that the easiest way to get good grades is to agree with everything the teachers say.
- 83. I believe that one way to get good grades is by using flattery on your teachers.
- 11. I feel that teachers allow their likes or dislikes for students to influence their grading too much.
- 75. I think that students who ask questions and take part in class discussion are only trying to "get in good" with the teacher.

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- 79. I believe that teachers deliberately give tests on the days following parties and ball games.
 - 31. When explaining a lesson or answering questions, my teachers use words that I do not understand.

- 59. I feel that teachers tend to look down upon their poorer students and make fun of their mistakes.
- 47. I think that teachers tend to talk too much.
- 95. I feel that students cannot be expected to like most teachers.
- 35. My teachers fail to give enough explanation of the things they are trying to teach.
- 27. I think that teachers expect students to do too much studying outside of class.
- 91. I feel that the ridiculous assignments made by teachers are the main reason for student cheating.
- 87. I feel that it is almost impossible for the average student to do all of his assigned homework.

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- 88. I feel that the things taught in school do not help one to meet adult problems.
 - 71. I feel that teachers think more about grades than they do about the real purpose of schools.
 - 67. I think that football coaches do more for school life than do the teachers.
 - 99. I believe that teachers go into teaching mainly
AA because they enjoy it.
 - 51. I feel that teachers try to give the same amount
AA of attention and help to all their students.
 - 48. I believe that teachers tend to avoid discussing present-day problems and events with their classes.
 - 20. I believe that teachers really want their students
AA to like them.
 - 24. I feel that students are not given enough freedom in selecting their own topics for themes and reports.
 - 4. My dislike for certain teachers causes me to neglect my school work.

The means for this cluster are:

Overachievers' mean on total cluster 5 = 23.35
 Underachievers' mean on total cluster 5 = 21.84
 KR 20 = 0.85; T= 1.51; P= 0.13 (non-significant)
 Adjusted for 25 items = 0.87

The difference in means is not significant. Hence, the attitudes expressed in this cluster apply equally to over- and underachievers without differentiating between them.

Most of the items express feelings toward teachers. Again, there appears to be a psychological subdivision within the cluster. The first four items express feelings about what might be called the 'teacher's pet'.

The remaining items describe feelings which ascribe some haughtiness to teachers, almost bordering on malevolence. There is a hint in the items that teachers tend to give deliberately excessive and ridiculous assignments, and that they are overbearing in class. In addition, there is a suggestion here that the material taught by teachers has little relevance in helping one overcome adult problems, and that teachers avoid discussing the issues which are important to the students.

Since all but two items of this cluster are being scored on the 'rarely' end of the scale, and since both the over- and underachievers scored means of roughly 22 for the 22 items in this cluster, the conclusion is that both the over- and underachievers tend to disagree equally with the ideational content expressed in these items. Hence, this large and reliable cluster of items does not

contribute in terms of differentiating between over- and underachievers.

Items in Total Cluster Number 6 :

- 21. When I am having trouble with my school work,
AA I try to talk it over with the teacher.
- 22. I hesitate to ask a teacher for further explanation of an assignment that is not clear to me.
- 42. I skip over the figures, graphs, and tables in a reading assignment.

The means for this cluster are:

Overachievers' mean on total cluster 6 = 1.71
 Underachievers' mean on total cluster 6 = 1.89
 KR 20 = 0.59; T= 1.20; P= 0.23 (non-significant)
 Adjusted for 25 items = 0.92

As will be noted, the reliability coefficient for this, and subsequent clusters, decreases rapidly. This indicates that the students' responses to these items are more varried than has been the case with the preceding items.

This cluster indicates that there is no difference among the over- and underachievers as far as seeking additional help from their teachers is concerned. The means indicate that neither group tends to approach their teachers very often for assistance.

Items in Total Cluster Number 7 :

- 26. I get nervous and confused when taking a test and fail to answer questions as well as I otherwise could.
- 74. I lose points on tests because I change my first answer only to discover later that I was right the first time.
- 92. Too much reading or studying gives me a headache.

- 86. Although I work until the last possible minute, I am unable to finish tests within the time allowed.
- 34. In taking notes, I tend to write down things which later turn out to be unimportant.
- 18. I memorize spelling rules, definitions of words, rules of grammar etc., without really understanding them.
- 33. Interruptions disturb my studies when I am studying at home.
- 66. I can study a reading assignment for only a short while before the words stop making sense.
- 69. Problems outside of school - with other students or at home - cause me to neglect my school work.

The means for this cluster are:

Overachievers' mean on total cluster 7	=	7.48
Underachievers' mean on total cluster 7	=	9.43
KR 20 for this cluster	=	0.66; T=3.12; P= 0.0021
Adjusted for 25 items	=	0.85

All items in this cluster are scored on the 'rarely' end of the scoring scale. Thus, the difference in means indicates that underachievers tend to feel that the meaning of these items applies to them more rarely than do over-achievers.

The underlying theme again appears to be some anxiety about not being able to perform as well as might be expected, or desired. There appears a hint of emotional problems due to test anxiety, or possibly other reasons which may be used as excuses for not doing well.

In many ways, this cluster is similar to cluster 3. It confirms the trend of cluster 3 which indicated that

underachievers seem to worry less about their performance in school than do overachievers.

Items in Total Cluster Number 8 :

- 56. I feel that it is not worth the time, money, and effort that one must spend to get a college education.
- 64. I feel that I am taking subjects which will do me little good.
- 84. I think that it might be best for me to drop out of school and get a job.
- 76. I feel that the main reason for going to college is to be admired and envied by others.
- 80. I believe that having a winning football team is just as important as learning history or math.

The means for this cluster are:

Overachievers' mean on total cluster 8	=	7.54
Underachievers' mean on total cluster 8	=	7.09
KR 20 for this cluster	=	0.46; T= 2.45; P= 0.015
Adjusted for 25 items	=	0.81

All the items downgrade the value of an education.

The high means for the five items of this cluster indicate that both over- and underachievers disagree rather strongly with the ideas expressed in these items. Yet, there was a greater variability of responses among the underachievers, indicating that perhaps a small minority among them does not place too much emphasis on the value of an education.

Items in Total Cluster Number 9 :

- 77. I like to have a radio, record player, or television set turned on while I'm studying.
- 93. I prefer to study my lessons alone rather than
AA with others.

58. When reading a long assignment, I stop now
AA and then to try to remember what I have read.
54. When in doubt about the proper form for a
AA written assignment, I find a model or guide to follow.
2. In preparing reports, themes, and other written
AA work, I make certain that I clearly understand
what is wanted before I begin work.

The means for this cluster are:

Overachievers' mean on total cluster 9 = 4.93
Underachievers' mean on total cluster 9 = 4.58
KR 20 = 0.48; T= 0.44; P= 0.66 (non-significant)
Adjusted for 25 items = 0.82

The items in this cluster express the idea of having
a clear plan, or method of doing home work and assignments.

The above means indicate that neither over- nor under-
achievers appear to have such plans very often. Hence, this
trait does not distinguish either group from the other.

Items in Total Cluster Number 10 :

52. I feel that my grades show about what I can
AA really do.
68. I believe that the main job of the schools is to
teach students things that will help them earn
a living.
8. I feel that I would study harder if I were given
more freedom to choose subjects that I like.

The means for this cluster are:

Overachievers' mean on total cluster 10 = 1.52
Underachievers' mean on total cluster 10 = 1.01
KR 20 for this cluster = 0.25; T= 3.84; P= 0.00012
Adjusted for 25 items = 0.73

The low reliability indicates that the items have
relatively little in common. This is indeed the case.
As the pool of items becomes progressively more exhausted,

the reliability will decrease, and items which have little in common will cluster under this reduced reliability. An individual examination of the items showed that the difference in the means of this cluster is primarily attributable to item No. 52. Overachievers tended to answer it 'almost always', while underachievers responded with 'rarely' to this item. Hence, these responses indicate that both groups appear to be quite aware of their abilities and their achievements at the grade twelve level.

To avoid repetitiveness, the analysis of the overachiever clusters, and the underachiever clusters has been placed in Appendix B.

In summary, it is probably fair to say that the a posteriori clusters could be interpreted with relative ease. In addition, many of the differentiating attitudes expressed in these clusters had formerly been found by other researchers. However, several attitudes which by virtue of including items representative of these attitudes had previously been judged as differentiating turned out to be non-differentiating in the present population.

CHAPTER V

SUMMARY, CONCLUSIONS, AND SUGGESTIONS FOR FURTHER RESEARCH

In an attempt to identify study habits and attitudes which may be predictive of academic underachievement, this study explored the possibility of selecting clusters of homogeneous items from the Brown & Holtzman Survey of Study Habits and Attitudes such that scores on these clusters will yield a high correlation with over- and underachievement.

A sample of 229 overachievers and 182 underachievers was selected from the grade XII population of the Province of Alberta. These students, then, answered the Brown and Holtzman survey.

Their responses to each of the 100 items were cluster-analyzed by the "method of homogeneous keying" of DuBois, Loevinger, and Gleser (1952).

The result of this analysis was the formation of psychometrically homogeneous clusters of items. To compare these clusters with the subjectively developed a priori clusters of Brown & Holtzman, several hypotheses were tested:

Testing of Hypothesis I showed that the method of homogeneous keying yielded clusters of higher reliability than the subjective clusters of Brown & Holtzman. The difference was, however, rather small. The reasons for this could be:

1. It is difficult to improve a reliability coefficient when it is already about 0.9.
2. The SSHA contains a substantial proportion of carefully chosen items so that the a priori clusters already have rather high internal consistency. Hence, the cluster analysis could not improve the reliability remarkably.

However, the cluster analysis showed that a somewhat superior reliability can be obtained by using only 69 items of the original 100 items. Thus, it has been shown that the value of such an analysis lies primarily in its ability to reject items which do not contribute to any of the scales.

Testing of Hypothesis II showed that these more reliable a posteriori clusters differentiate between over- and underachievers as well as the a priori clusters, in spite of the fact that the former contain only about half the items of the latter. Hence, improving the cluster reliability by eliminating non-discriminating items did not adversely affect the differentiating power of the inventory.

Testing of Hypothesis III showed that cluster analysis yields more independent clusters than a priori clustering. These clusters were then individually examined for their psychological meaning. The following attitudinal similarities and differences between over- and under-achievers were established:

1. Underachievers tend to see slightly more negative personality characteristics in their teachers than

overachievers. This is supported by previous research of Alves (1960), Mason (1958), and Shaw, et al (1960, 1964).

2. Underachievers appear to practice less self-discipline than overachievers. This is also supported by previous research (Kisch, 1968; Miller, 1962).
3. Underachievers seem to be less interested in school; they have a greater tendency to see school as being dull, and boring than overachievers, again consistent with earlier research (Haywood, 1968).
4. Overachievers are more thorough, neat, and persistent in doing home work than underachievers.
5. Overachievers feel that they are more rarely criticized by their teachers for poor work than underachievers.
6. Overachievers appear to be more anxious about being able to remember, or to think clearly, than underachievers.
7. Overachievers appear to be more self-critical regarding careless punctuation errors than are underachievers.
8. There is no apparent difference in the feelings of either group regarding the value of an education. Both groups indicated that acquiring an education is a worthwhile goal. However, a minority among the underachievers seems to disagree.
9. There appears to be no difference among the groups in how they plan their work. Neither group is very systematic in their planning - a finding consistent with that of DeSena (1964), and Finger and Schlessner (1965).

10. Most underachievers seem to know that they can do better than they are doing.

Hence, the SSHA does indicate several of the study habits and attitudes which have been found to characterize underachievers. It appears that the authors of the SSHA selected the items very carefully.

However, the inventory also contains a rather large pool of items which do not contribute to differentiation in the population used for this research. These items appear to be scattered throughout the test. Whereas these items may have discriminated between under- and overachievers in the norming population, they did not discriminate in the present population. It is, of course, known that attitudinal measures change over time, and/or geographical areas. As Deese pointed out (in Buros, 1965), a curious feature of the SSHA is that it yields consistently higher correlations with grade point averages of Texan college students than of students from any other part of the country. However, the irrelevance of the aforementioned items in non-Albertan populations was also found by other researchers (Kisch, 1968; Shaw, et al, 1960, 1964).

A real shortcoming of the inventory in terms of its applicability to Albertan students is the scoring key. Whereas Brown and Holtzman designed the scoring key such that a high score will indicate the response tendencies of good students, a glance at the cluster means of Table VI indicates some serious discrepancy. As can be seen, the

underachievers' mean on the SSHA Work Method cluster is higher than that of the overachievers. The contradiction is obvious. Similarly, on some of the a posteriori clusters underachievers received higher mean scores than overachievers (see summary table in Appendix C).

In addition, many of the items appear to be worded too strongly to be scaleable on the 'rarely' to 'almost always' scale. An extreme example of this is shown in item No. 76:

76. I feel that the main reason for going to college is to be admired and envied by others.

Cummulative response frequencies for the five point scale on this item were (in percentages):

	'rarely'	1	2	3	4	5	'almost always'
Overachievers		82	14	1	2	1	
Underachievers		81	14	3	1	1	

The item is consistent with the objectives of the scoring key which has been designed from the responses of good students. As can be seen, good students do indeed feel that this item applies 'rarely' to them, but so does everybody else. This item may be illustrative of attitudinal change over time: When the SSHA was designed in 1953, college attendance may well have been more of a status affair than it is today.

Another example of poor scoring is item No. 86:

86. Although I work until the last possible minute, I am unable to finish tests within the time allowed.

	'rarely'	1	2	3	4	5	'almost always'
Overachievers		33	42	13	6	6	
Underachievers		48	33	8	6	5	

Again, this item is scored on the 'rarely' end. Note,

however, that the principal differentiating power of this item is between the 'rarely' and the 'sometimes' category of the scale. In addition, note that underachievers feel that way more rarely than do overachievers.

Lastly, consider item No. 72. This item has been chosen because it seems to be perfect for scaling.

72. I try to become really interested in every subject I take.

	'rarely'	1	2	3	4	5	'almost always'
Overachievers		7	16	25	38	14	
Underachievers		18	28	21	27	6	

The item is bipolar in a sense that responses at opposite ends of the scale tend to differentiate well between over- and underachievers. This item is scored on the 'almost always' end of the scale. The reason for using it as an illustration is to show that the present scoring key extracts only about 50% of the available information from the students' responses to this item. Obviously, a key which would score this item for each response category would make use of more available information than the SSHA scoring key which uses only two of the five response categories for scoring purposes. For a tabulation of the remaining items, see Appendix D.

In summary, it appears that the main shortcomings of the SSHA are twofold:

- 1. The clustering into four a priori subtests does not appear to be appropriate for the present population. Only two of these a priori clusters differentiate to a useful

extent between over- and underachievers in this population.

2. The scoring key needs to be revised so that it will make use of all available information. Whereas for hand scoring a simple key is obviously an asset, the complexity of the key becomes irrelevant where answers are processed by computers. Since computing facilities are inexpensively available everywhere now, a simple scoring key need no longer be an objective of test construction.

CONCLUSIONS AND RECOMMENDATIONS

This research established the feasibility of applying multivariate techniques to attitude tests. In addition, it established that over- and underachievers in Alberta's high schools can be differentiated by a number of personality factors some of which have been established as correlates of achievement in related researches. Also, these characteristics could be shown by using a very heterogeneous population.

The present research is intended to be a step in developing scales for the prediction of underachievement. For this purpose, it was important to establish the feasibility of using cluster analysis for making independent and reliable scales. The results have been encouraging.

However, further work should be done on the data, taking additional variables, such as sex and environment, into

consideration. Since the SSHA was originally developed with different scoring keys for men and women, a cluster analysis by sex might reveal differences important enough to warrant reintroducing different scoring keys for each sex. Similar differences might be found between urban and rural environments. This would, of course, increase the complexity of scoring the responses. Yet, while the person who is only familiar with hand scoring will likely shy away from an inventory which uses several keys, it must be emphasized again that with machine scoring, the complexity of the key, or of several keys, is not relevant.

A final comment is in order about the method of data collection which was used in this study. As will be recalled, the inventories were mailed to the students selected from Department of Education files. This mailing approach was only resorted to after both the Edmonton Public, and Separate School Boards had refused permission to the researcher to enter their schools for the purpose of gathering the necessary data. As it turned out, the mailing approach, with 90% returns, was successful beyond expectations. In addition, it is felt that the participating students may have spent more time in answering the various items in the inventory during a leisure hour at home, than they may have done at school. Thus, the validity of the present data may well have been enhanced by using the mailing approach (see also Brown, 1964).

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APPENDICES

APPENDIX A

SAMPLE OF THE SSHA AS MAILED



Dear Student,

Last week, we sent you a questionnaire and asked you to let us have your opinion. Perhaps you have forgotten, or perhaps you have misplaced it?

So we decided to send you another copy. We would very much appreciate if you let us have your answer. It will only take a little of your time, and it will help us a great deal.

If you have already mailed your answer, please disregard this reminder. But if you have not, may we cordially ask you to do us the favour.

Thank you ever so much for your co-operation.



May, 1969

Dear Student,

Much has been said and written about student attitudes, and also about how they handle their studies. These comments often do not have sufficient basis.

At the University of Alberta, we would like to find out what students really think about education, and how much time and effort they spend on it. For this purpose, we have devised a questionnaire which we are sending out to 500 students. These students were randomly selected from the whole Province of Alberta.

You are one of these 500 selected for this survey. Therefore, we would like to ask you to complete the attached questionnaire. We will then add your opinions to those of others in order to find out what most of you think.

Since everybody's opinion is unique, it is very important that every one of you answers so that our findings may be unbiased. The task will only take a few minutes of your time, and you will probably find it quite pleasant and interesting. We hope, therefore, that you will not mind to do it. Please do not let us down. We need your answer, and you may be assured that your co-operation will be very much appreciated and valued.

You will find directions on how to answer the questionnaire on the next page. If you follow the directions step by step, nothing can go wrong. When you have answered all the statements of the questionnaire, please return everything to us in the same envelope. Peel off the address sticker at the bottom of this page, and stick it over your name on the envelope. Similarly, stick the stamp over the stamp on the envelope, and then mail it back to us.

Thank you very much for your co-operation.

DIRECTIONS

The purpose of this survey is to determine students' attitudes and study habits. If you will honestly and thoughtfully mark all of the statements on the answer sheet, we will be able to learn what students really think and do about education. To make sure that your answer sheet will not be spoiled, please follow the steps outlined below.

1. Examine the answer sheet. It is the sheet printed in red ink. It has a space at the top for your name. You are not required to give your name. Thus, your answers will be completely confidential, so please answer exactly the way you feel. On the fourth line from the top is a space for your age and your sex. Please fill in your age and sex. That is all we want to know about you.
2. The answer sheet is divided into two parts, namely: PART 1, and PART 2. For this survey, we will use PART 1 (upper part) of the answer sheet only. Please use an HB pencil to mark the answer sheet.
3. Now look at the questionnaire. There are 100 statements to be answered. Decide how you feel about each statement and then mark your answer sheet in the following manner: choose one of five possible answers for each statement, depending upon whether the statement applies to you *rarely, sometimes, frequently, generally, or almost always*.
For example, if you feel that the statement is *rarely* true for you, blacken the space under A 1 of the corresponding number on the answer sheet.
If you feel that the statement is *almost always* true for you, blacken the space under E 5 of the corresponding number on the answer sheet.
4. Following is an explanation of the terms used for answering the statements:
A 1 - RARELY means from 0 to 15 per cent of the time, or occasions.
B 2 - SOMETIMES means from about 16 to 35 per cent of the time, or occasions.
C 3 - FREQUENTLY means about half of the time (36 to 65 per cent).
D 4 - GENERALLY means from about 66 to 85 per cent of the time, or occasions.
E 5 - ALMOST ALWAYS means from about 86 to 100 per cent of the time.

Please note that these five possible answers are printed across the top of each page of the questionnaire for ready reference.

5. Remember you are asked to rate yourself not as you think you should feel or do but as you are actually in the habit of doing or feeling. If you cannot answer a statement because it does not apply to you, then guess how you would feel if the situation should arise. There are no "right" or "wrong" answers to these statements, and there is no time limit for answering. However, try to do it quickly, without spending too much time on any one statement.
6. In marking your answers, be sure that the number of the statement agrees with the number on your answer sheet. If you wish to change an answer, make sure to erase the old mark completely. Please do not omit any statements. We hope you will have fun answering the questionnaire.
7. When you have answered all the statements, please mail the questionnaire and the answer sheet back to us. You will find a stamp and an address sticker on the attached letter. Please peel off the address sticker and stick it on the envelope so that it covers your address (you may remove the old label with your own address if you wish). Also, stick the new stamp over the old one. In this way, the same envelope can be used again to mail back the answer sheet and the questionnaire.

Thank you very much for your co-operation.

A 1--RARELY B 2--SOMETIMES C 3--FREQUENTLY D 4--GENERALLY E 5--ALMOST ALWAYS

1. When my assigned homework is extra long or unusually hard, I either quit or study only the easier parts of the lesson.
2. In preparing reports, themes, and other written work, I make certain that I clearly understand what is wanted before I begin work.
3. I feel that teachers don't understand the needs and interests of students.
4. My dislike for certain teachers causes me to neglect my school work.
5. If I have to be absent from class, I make up missed lessons without being reminded by the teacher.
6. I have trouble saying what I want to say on tests, reports, and other work to be turned in.
7. My teachers make their subjects interesting and meaningful to me.
8. I feel that I would study harder if I were given more freedom to choose subjects that I like.
9. Daydreaming distracts my attention from my lessons while I am studying.
10. My teachers criticize my written work for being poorly planned or hurriedly written.
11. I feel that teachers allow their likes or dislikes for students to influence their grading too much.
12. Even though I don't like a subject, I still work hard to make a good grade.
13. Even though an assignment is dull and boring, I stick to it until it is completed.
14. I give special attention to neatness on themes, reports, and other work to be turned in.
15. I believe that the easiest way to get good grades is to agree with everything the teachers say.
16. I lose interest in my studies after the first few days of school.
17. I keep all my work for each subject together and carefully arranged in some planned order.
18. I memorize spelling rules, definitions of words, rules of grammar, etc., without really understanding them.
19. I think that teachers like to show who's boss too much.
20. I believe that teachers really want their students to like them.
21. When I am having trouble with my school work, I try to talk it over with the teacher.
22. I hesitate to ask a teacher for further explanation of an assignment that is not clear to me.
23. I feel that teachers are too narrow-minded and set in their ways.
24. I feel that students are not given enough freedom in selecting their own topics for themes and reports.
25. I do not bother to correct errors on the papers my teachers have graded and returned to me.
26. I get nervous and confused when taking a test and fail to answer questions as well as I otherwise could.
27. I think that teachers expect students to do too much studying outside of class.
28. Lack of interest in my school work makes it hard for me to keep my attention on my reading assignments.
29. My place of study at home is kept neat and businesslike.
30. I have trouble with spelling, grammar, and punctuation while writing themes and reports.
31. When explaining a lesson or answering questions, my teachers use words that I do not understand.
32. Unless I really like a subject, I believe in doing only enough to get a passing grade.
33. Interruptions disturb my studies when I am studying at home.
34. In taking notes, I tend to write down things which later turn out to be unimportant.

GO ON TO NEXT PAGE.

A 1--RARELY B 2--SOMETIMES C 3--FREQUENTLY D 4--GENERALLY E 5--ALMOST ALWAYS

35. My teachers fail to give enough explanation of the things they are trying to teach.
36. I feel confused and undecided as to what I want to study in school and what I want to do after I get out of school.
37. It takes a long time for me to get warmed up to the job of studying.
38. I do poorly on tests because I find it hard to think clearly and plan my work within a short period of time.
39. I feel that teachers are too strict and know-it-all in dealing with students.
40. Some of my school work is so uninteresting that I have to make myself do the assignments.
41. I am unable to study well because I get restless, moody, or have the blues.
42. I skip over the figures, graphs, and tables in a reading assignment.
43. I believe that teachers secretly enjoy giving their students a "hard time."
44. I believe that having a good time and getting one's full share of fun out of life is more important than studying.
45. I put off doing written assignments until the last minute.
46. After reading several pages of an assignment, I am unable to remember what I have just read.
47. I think that teachers tend to talk too much.
48. I believe that teachers tend to avoid discussing present-day problems and events with their classes.
49. When I sit down to study I find myself too tired, bored, or sleepy to study well.
50. I find it hard to pick out the important points of a reading assignment—points that later appear on tests.
51. I feel that teachers try to give the same amount of attention and help to all their students.
52. I feel that my grades show about what I can really do.
53. I waste too much time talking, watching TV, listening to the radio, going to the movies, etc., for the good of my studies.
54. When in doubt about the proper form for a written assignment, I find a model or guide to follow.
55. The illustrations, examples, and explanations given by my teachers are dull and hard to understand.
56. I feel that it is not worth the time, money, and effort that one must spend to get a college education.
57. My studying at home is done in an easy-going, unplanned manner.
58. When reading a long assignment, I stop now and then to try to remember what I have read.
59. I feel that teachers tend to look down upon their poorer students and make fun of their mistakes.
60. Some of my classes are so boring that I spend the class period drawing pictures, writing notes, or daydreaming instead of listening to the teacher.
61. Having too many other things to do causes me to get behind in my school work.
62. I seem to get very little done for the amount of time I spend studying.
63. I feel that teachers make their subjects too hard for the average student.
64. I feel that I am taking subjects which will do me little good.
65. I try to do my assignments at school so as to reduce my homework.
66. I can study a reading assignment for only a short while before the words stop making sense.
67. I think that football coaches do more for school life than do the teachers.
68. I believe that the main job of the schools is to teach students things that will help them earn a living.

GO ON TO NEXT PAGE.

A 1--RARELY B 2--SOMETIMES C 3--FREQUENTLY D 4--GENERALLY E 5--ALMOST ALWAYS

69. Problems outside of school—with other students or at home—cause me to neglect my school work.
70. I copy the diagrams, drawings, tables, and other illustrations that the teacher puts on the black-board.
71. I feel that teachers think more about grades than they do about the real purpose of schools.
72. I try to become really interested in every subject I take.
73. I complete my homework assignments on time.
74. I lose points on tests because I change my first answer only to discover later that I was right the first time.
75. I think that students who ask questions and take part in class discussion are only trying to “get in good” with the teacher.
76. I feel that the main reason for going to college is to be admired and envied by others.
77. I like to have a radio, record player, or television set turned on while I’m studying.
78. When getting ready for a test I arrange facts to be learned in some planned order—order of importance, order in which taught, order of time in history, etc.
79. I believe that teachers deliberately give tests on the days following parties and ball games.
80. I believe that having a winning football team is just as important as learning history or math.
81. With me, studying is sort of hit-or-miss depending on the mood I’m in.
82. I am careless about spelling, punctuation, and grammar when answering test questions.
83. I believe that one way to get good grades is by using flattery on your teachers.
84. I think that it might be best for me to drop out of school and get a job.
85. I study an hour or more each day outside of school.
86. Although I work until the last possible minute, I am unable to finish tests within the time allowed.
87. I feel that it is almost impossible for the average student to do all of his assigned homework.
88. I feel that the things taught in school do not help one to meet adult problems.
89. I keep my assignments up to date by doing my work regularly from day to day.
90. If time is left, I take a few minutes to check over my answers before turning in my test paper.
91. I feel that the ridiculous assignments made by teachers are the main reason for student cheating.
92. Too much reading or studying gives me a headache.
93. I prefer to study my lessons alone rather than with others.
94. When tests are returned, I find that my grade has been lowered by careless mistakes.
95. I feel that students cannot be expected to like most teachers.
96. I feel like skipping school whenever there is something I’d rather do.
97. At the beginning of a study period I plan my work so that I will make best use of my time.
98. During tests I forget names, dates, formulas, and other details that I really do know.
99. I believe that teachers go into teaching mainly because they enjoy it.
100. I believe that higher grades are given to students who can memorize facts than to those who “think” things through.

APPENDIX B

OVERACHIEVER AND UNDERACHIEVER CLUSTERS

OVERACHIEVER CLUSTERS

The following ten clusters resulted from analyzing the responses of the 115 overachievers of sample A.

Items in Overachiever Cluster Number 1 :

- 19. I think that teachers like to show who's boss too much.
- 23. I feel that teachers are too narrow-minded and set in their ways.
- 39. I feel that teachers are too strict and know-it-all in dealing with students.
- 43. I believe that teachers secretly enjoy giving their students a "hard time."
- 03. I feel that teachers don't understand the needs and interests of students.

Overachievers' mean on cluster 1 = 5.62
 Underachievers' mean on cluster 1 = 4.44
 KR 20 = 0.86; T = 3.29; P = 0.0012

Items in Overachiever Cluster Number 2 :

- 16. I lose interest in my studies after the first few days of school.
- 41. I am unable to study well because I get restless, moody, or have the blues.
- 49. When I sit down to study I find myself too tired, bored, or sleepy to study well.
- 37. It takes a long time for me to get warmed up to the job of studying.

Overachievers' mean on cluster 2 = 3.60
 Underachievers' mean on cluster 2 = 2.42
 KR 20 = 0.80; T = 4.07; P = 0.000067

Items in Overachiever Cluster Number 3 :

- 13. Even though an assignment is dull and boring,
AA I stick to it until it is completed.
- 12. Even though I don't like a subject, I still work
AA hard to make a good grade.
- 1. When my assigned homework is extra long or
unusually hard, I either quit or study only the
easier parts of the lesson.
- 73.AA I complete my homework assignments on time.
- 72. I try to become really interested in every subject
AA I take.
- 89. I keep my assignments up to date by doing my
AA work regularly from day to day.
- 90. If time is left, I take a few minutes to check
AA over my answers before turning in my test
paper.
- 14. I give special attention to neatness or themes,
AA reports, and other work to be turned in.
- 81. With me, studying is sort of hit-or-miss depend-
ing on the mood I'm in.
- 10. My teachers criticize my written work for being
poorly planned or hurriedly written.

Overachievers' mean on cluster 3 = 10.29
Underachievers' mean on cluster 3 = 7.69
KR 20 = 0.86; T = 4.01; P = 0.000085

Items in Overachiever Cluster Number 4 :

- 38. I do poorly on tests because I find it hard to
think clearly and plan my work within a short
period of time.
- 6. I have trouble saying what I want to say on
tests, reports, and other work to be turned in.
- 98. During tests I forget names, dates, formulas,
and other details that I really do know.
- 50. I find it hard to pick out the important points of
a reading assignment - points that later appear
on tests.

Overachievers' mean on cluster 4 = 3.63
 Underachievers' mean on cluster 4 = 4.22
 KR 20 = 0.78; T = -2.01 P = 0.045

Items in Overachiever Cluster Number 5 :

- 53. I waste too much time talking, watching TV, listening to the radio, going to the movies, etc., for the good of my studies.
- 57. My studying at home is done in an easy-going, unplanned manner.
- 82. I am careless about spelling, punctuation, and grammar when answering test questions.
- 60. Some of my classes are so boring that I spend the class period drawing pictures, writing notes, or daydreaming instead of listening to the teacher.
- 55. The illustrations, examples, and explanations given by my teachers are dull and hard to understand.
- 40. Some of my school work is so uninteresting that I have to make myself do the assignments.
- 32. Unless I really like a subject, I believe in doing only enough to get a passing grade.
- 44. I believe that having a good time and getting one's full share of fun out of life is more important than studying.
- 7. My teachers make their subjects interesting and meaningful to me.
- 84. I think that it might be best for me to drop out of school and get a job.
- 46. After reading several pages of an assignment, I am unable to remember what I have just read.
- 79. I believe that teachers deliberately give tests on the days following parties and ball games.
- 31. When explaining a lesson or answering questions, my teachers use words that I do not understand.

76. I feel that the main reason for going to college is to be admired and envied by others.
27. I think that teachers expect students to do too much studying outside of class.
96. I feel like skipping school whenever there is something I'd rather do.
61. Having too many other things to do causes me to get behind in my school work.
66. I can study a reading assignment for only a short while before the words stop making sense.
9. Daydreaming distracts my attention from my lessons while I am studying.
25. I do not bother to correct errors on the papers my teachers have graded and returned to me.
17. I keep my work for each subject together and
AA carefully arranged in some planned order.
94. When tests are returned, I find that my grade has been lowered by careless mistakes.
45. I put off doing written assignments until the last minute.
80. I believe that having a winning football team is just as important as learning history or math.
5. If I have to be absent from class, I make up
AA missed lessons without being reminded by the teacher.
30. I have trouble with spelling, grammar, and punctuation while writing themes and reports.
48. I believe that teachers tend to avoid discussing present-day problems and events with their classes.
2. In preparing reports, themes, and other written
AA work, I make certain that I clearly understand what is wanted before I begin work.
42. I skip over the figures, graphs, and tables in a reading assignment.
87. I feel that it is almost impossible for the average student to do all of his assigned homework.

83. I believe that one way to get good grades is by using flattery on your teachers.
35. My teachers fail to give enough explanation of the things they are trying to teach.
92. Too much reading or studying gives me a headache.
78. When getting ready for a test I arrange facts
AA to be learned in some planned order - order of importance, order in which taught, order of time in history, etc.
29. My place of study at home is kept neat and
AA businesslike.
97. At the beginning of a study period I plan my
AA work so that I will make best use of my time.
85. I study an hour or more each day outside of
AA school.

Overachievers' mean on cluster 5 = 36.24
Underachievers' mean on cluster 5 = 33.01
KR 20 = 0.89; T = 2.12; P = 0.035

Items in Overachiever Cluster Number 6 :

11. I feel that teachers allow their likes or dislikes for students to influence their grading too much.
20. I believe that teachers really want their students
AA to like them.
47. I think that teachers tend to talk too much.
51. I feel that teachers try to give the same amount
AA of attention and help to all their students.
59. I feel that teachers tend to look down upon their poorer students and make fun of their mistakes.
63. I feel that teachers make their subjects too hard for the average student.
67. I think that football coaches do more for school life than do the teachers.
71. I feel that teachers think more about grades than they do about the real purpose of schools.

- 75. I think that students who ask questions and take part in class discussion are only trying to "get in good" with the teacher.
- 88. I feel that the things taught in school do not help one to meet adult problems.
- 91. I feel that the ridiculous assignments made by teachers are the main reason for student cheating.
- 95. I feel that students cannot be expected to like most teachers.
- 99. I believe that teachers go into teaching mainly
AA because they enjoy it.
- 100. I believe that higher grades are given to students who can memorize facts than to those who 'think' things through.

Overachievers' mean on cluster 6 = 14.52
 Underachievers' mean on cluster 6 = 12.88
 KR 20 = 0.79; T = 2.33; P = 0.02

Items in Overachiever Cluster Number 7 :

- 34. In taking notes, I tend to write down things which later turn out to be unimportant.
- 62. I seem to get very little done for the amount of time I spend studying.
- 33. Interruptions disturb my studies when I am studying at home.
- 86. Although I work until the last possible minute, I am unable to finish tests within the time allowed.
- 26. I get nervous and confused when taking a test and fail to answer questions as well as I otherwise could.
- 74. I lose points on tests because I change my first answer only to discover later that I was right the first time.
- 69. Problems outside of school - with other students or at home - cause me to neglect my school work.

18. I memorize spelling rules, definitions of words, rules of grammar etc., without really understanding them.
36. I feel confused and undecided as to what I want to study in school and what I want to do after I get out of school

Overachievers' mean on cluster 7 = 8.01
 Underachievers' mean on cluster 7 = 8.84
 KR 20 = 0.70; T = -1.72; P = 0.087

Items in Overachiever Cluster Number 8 :

64. I feel that I am taking subjects which will do me little good.
56. I feel that it is not worth the time, money, and effort that one must spend to get a college education.
22. I hesitate to ask a teacher for further explanation of an assignment that is not clear to me.
21. When I am having trouble with my school work,
 AA I try to talk it over with the teacher.
15. I believe that the easiest way to get good grades is to agree with everything the teachers say.

Overachievers' mean on cluster 8 = 5.55
 Underachievers' mean on cluster 8 = 4.81
 KR 20 = 0.60; T = 2.57; P = 0.011

Items in Overachiever Cluster Number 9 :

77. I like to have a radio, record player, or television set turned on while I'm studying.
58. When reading a long assignment, I stop now
 AA and then to try to remember what I have read.
93. I prefer to study my lessons alone rather than
 AA with others.
54. When in doubt about the proper form for a
 AA written assignment, I find a model or guide to follow.

70. I copy the diagrams, drawings, tables, and other illustrations that the teacher puts on the black-board.

Overachievers' mean on cluster 9 = 4.83
 Underachievers' mean on cluster 9 = 4.32
 KR 20 = 0.53; T = 1.71; P = 0.088

Items in Overachiever Cluster Number 10 :

8. I feel that I would study harder if I were given more freedom to choose subjects that I like.
24. I feel that students are not given enough freedom in selecting their own topics for themes and reports.
52. I feel that my grades show about what I can
 AA really do.
68. I believe that the main job of the schools is to teach students things that will help them earn a living.

Overachievers' mean on cluster 10 = 2.07
 Underachievers' mean on cluster 10 = 1.34
 KR 20 = 0.43; T = 3.61; P = 0.00039

UNDERACHIEVER CLUSTERS

The following ten clusters resulted from analyzing the responses of the 91 underachievers of sample A.

Items in Underachiever Cluster Number 1 :

- 39. I feel that teachers are too strict and know-it-all in dealing with students.
- 19. I think that teachers like to show who's boss too much.
- 23. I feel that teachers are too narrow-minded and set in their ways.
- 03. I feel that teachers don't understand the needs and interests of students.

Overachievers'	mean on cluster	1	=	3.43
Underachievers'	mean on cluster	1	=	3.02
KR 20 = 0.84;	T = 1.27;		P = 0.21	

Items in Underachiever Cluster Number 2 :

- 29. My place of study at home is kept neat and businesslike.
AA
- 17. I keep my work for each subject together and carefully arranged in some planned order.
AA
- 57. My studying at home is done in an easy-going, unplanned manner.
- 89. I keep my assignments up to date by doing my work regularly from day to day.
AA
- 12. Even though I don't like a subject, I still work hard to make a good grade.
AA
- 52. I feel that my grades show about what I can really do.
AA
- 72. I try to become really interested in every subject I take.
AA

40. Some of my school work is so uninteresting that I have to make myself do the assignments.
49. When I sit down to study I find myself too tired, bored, or sleepy to study well.
- 73.AA I complete my homework assignments on time.
1. When my assigned homework is extra long or unusually hard, I either quit or study only the easier parts of the lesson.
13. Even though an assignment is dull and boring,
AA I stick to it until it is completed.
44. I believe that having a good time and getting one's full share of fun out of life is more important than studying.
81. With me, studying is sort of hit-or-miss depending on the mood I'm in.
60. Some of my classes are so boring that I spend the class period drawing pictures, writing notes, or daydreaming instead of listening to the teacher.
9. Daydreaming distracts my attention from my lessons while I am studying.
16. I lose interest in my studies after the first few days of school.
85. I study an hour or more each day outside of
AA school.
41. I am unable to study well because I get restless, moody, or have the blues.
96. I feel like skipping school whenever there is something I'd rather do.
10. My teachers criticize my written work for being poorly planned or hurriedly written.
28. Lack of interest in my school work makes it hard for me to keep my attention on my reading assignments.

Overachievers'	mean on cluster	19.04
Underachievers'	mean on cluster	12.46
KR 20 = 0.93;	T = 5.32;	P = 0.0000003

Items in Underachiever Cluster Number 3 :

- 25. I do not bother to correct errors on the papers my teachers have graded and returned to me.
- 5. If I have to be absent from class, I make up missed lessons without being reminded by the teacher.
- AA
- 70. I copy the diagrams, drawings, tables, and other illustrations that the teacher puts on the black-board.

Overachievers' mean on cluster 3 = 3.05
 Underachievers' mean on cluster 3 = 1.99
 KR 20 = 0.75; T = 4.14; P = 0.00005

Items in Underachiever Cluster Number 4 :

- 24. I feel that students are not given enough freedom in selecting their own topics for themes and reports.
- 27. I think that teachers expect students to do too much studying outside of class.
- 88. I feel that the things taught in school do not help one to meet adult problems.
- 35. My teachers fail to give enough explanation of the things they are trying to teach.
- 63. I feel that teachers make their subjects too hard for the average student.
- 31. When explaining a lesson or answering questions, my teachers use words that I do not understand.
- 43. I believe that teachers secretly enjoy giving their students a "hard time."
- 83. I believe that one way to get good grades is by using flattery on your teachers.
- 79. I believe that teachers deliberately give tests on the days following parties and ball games.
- 11. I feel that teachers allow their likes or dislikes for students to influence their grading too much.

75. I think that students who ask questions and take part in class discussion are only trying to "get in good" with the teacher.
55. The illustrations, examples, and explanations given by my teachers are dull and hard to understand.
91. I feel that the ridiculous assignments made by teachers are the main reason for student cheating.
87. I feel that it is almost impossible for the average student to do all of his assigned homework.
71. I feel that teachers think more about grades than they do about the real purpose of schools.
4. My dislike for certain teachers causes me to neglect my school work.
15. I believe that the easiest way to get good grades is to agree with everything the teachers say.
59. I feel that teachers tend to look down upon their poorer students and make fun of their mistakes.
95. I feel that students cannot be expected to like most teachers.
48. I believe that teachers tend to avoid discussing present-day problems and events with their classes.
47. I think that teachers tend to talk too much.
66. I can study a reading assignment for only a short while before the words stop making sense.
67. I think that football coaches do more for school life than do the teachers.
46. After reading several pages of an assignment, I am unable to remember what I have just read.
18. I memorize spelling rules, definitions of words, rules of grammar etc., without really understanding them.
37. It takes a long time for me to get warmed up to the job of studying.

77. I like to have a radio, record player, or television set turned on while I'm studying.

Overachievers' mean on cluster 4 = 26.25
 Underachievers' mean on cluster 4 = 26.82
 KR 20 = 0.89; T = -0.45; P = 0.65

Items in Underachiever Cluster Number 5 :

86. Although I work until the last possible minute, I am unable to finish tests within the time allowed.
38. I do poorly on tests because I find it hard to think clearly and plan my work within a short period of time.
6. I have trouble saying what I want to say on tests, reports, and other work to be turned in.
50. I find it hard to pick out the important points of a reading assignment - points that later appear on tests.
62. I seem to get very little done for the amount of time I spend studying.
61. Having too many other things to do causes me to get behind in my school work.
34. In taking notes, I tend to write down things which later turn out to be unimportant.
82. I am careless about spelling, punctuation, and grammar when answering test questions.
94. When tests are returned, I find that my grade has been lowered by careless mistakes.
98. During tests I forget names, dates, formulas, and other details that I really do know.
74. I lose points on tests because I change my first answer only to discover later that I was right the first time.
69. Problems outside of school - with other students or at home - cause me to neglect my school work.
33. Interruptions disturb my studies when I am studying at home.

22. I hesitate to ask a teacher for further explanation of an assignment that is not clear to me.
32. Unless I really like a subject, I believe in doing only enough to get a passing grade.
45. I put off doing written assignments until the last minute.

Overachievers' mean on cluster 5 = 13.13
 Underachievers' mean on cluster 5 = 14.30
 KR 20 = 0.84; T = -1.32; P = 0.19

Items in Underachiever Cluster Number 6 :

14. I give special attention to neatness or themes,
 AA reports, and other work to be turned in.
97. At the beginning of a study period I plan my
 AA work so that I will make best use of my time.
78. When getting ready for a test I arrange facts
 AA to be learned in some planned order - order of importance, order in which taught, order of time in history, etc.
2. In preparing reports, themes, and other written
 AA work, I make certain that I clearly understand what is wanted before I begin work.
21. When I am having trouble with my school work,
 AA I try to talk it over with the teacher.
7. My teachers make their subjects interesting and
 AA meaningful to me.
54. When in doubt about the proper form for a
 AA written assignment, I find a model or guide to follow.
58. When reading a long assignment, I stop now
 AA and then to try to remember what I have read.
90. If time is left, I take a few minutes to check
 AA over my answers before turning in my test paper.

Overachievers' mean on cluster 6 = 6.30
 Underachievers' mean on cluster 6 = 5.92
 KR 20 = 0.80; T = 0.77; P = 0.45

Items in Underachiever Cluster Number 7 :

20. I believe that teachers really want their students
AA to like them.
99. I believe that teachers go into teaching mainly
AA because they enjoy it.
51. I feel that teachers try to give the same amount
AA of attention and help to all their students.
80. I believe that having a winning football team is
just as important as learning history or math.
26. I get nervous and confused when taking a test
and fail to answer questions as well as I other-
wise could.

Overachievers' mean on cluster 7 = 4.61
Underachievers' mean on cluster 7 = 4.84
KR 20 = 0.53; T = -0.78; P = 0.44

Items in Underachiever Cluster Number 8 :

8. I feel that I would study harder if I were given
more freedom to choose subjects that I like.
64. I feel that I am taking subjects which will do me
little good.
100. I believe that higher grades are given to students
who can memorize facts than to those who
'think' things through.
76. I feel that the main reason for going to college
is to be admired and envied by others.

Overachievers' mean on cluster 8 = 3.87
Underachievers' mean on cluster 8 = 3.37
KR 20 = 0.44; T = 2.18; P = 0.030

Items in Underachiever Cluster Number 9 :

- 42. I skip over the figures, graphs, and tables in a reading assignment.
- 65. I try to do my assignments at school so as to
AA reduce my homework.
- 53. I waste too much time talking, watching TV, listening to the radio, going to the movies, etc., for the good of my studies.

Overachievers' mean on cluster 9 = 1.98
 Underachievers' mean on cluster 9 = 1.97
 KR 20 = 0.41; T = 0.07; P = 0.94

Items in Underachiever Cluster Number 10 :

- 56. I feel that it is not worth the time, money, and effort that one must spend to get a college education.
- 93. I prefer to study my lessons alone rather than
AA with others.
- 84. I think that it might be best for me to drop out of school and get a job.
- 30. I have trouble with spelling, grammar, and punctuation while writing themes and reports.

Overachievers' mean on cluster 10 = 5.86
 Underachievers' mean on cluster 10 = 5.86
 KR 20 = 0.38; T = 0.01; P = 0.99

APPENDIX C

SUMMARY OF T-TESTS FOR EACH CLUSTER

SSHA CLUSTERS

CLUSTER	OA-MN	UA-MN	OA-SD	UA-SD	T	P-TWO TAILED
DA	20.57	15.59	9.58	9.09	3.76	0.00022
WM	22.68	24.97	7.05	8.66	-2.08	0.039
TA	27.50	24.98	8.94	8.32	2.06	0.041
EA	26.14	20.86	7.78	7.41	4.91	0.0000019

TOTAL CLUSTERS

CLUSTER	OA-MN	UA-MN	OA-SD	UA-SD	T	P-TWO TAILED
1	5.62	4.44	2.64	2.44	3.29	0.0012
2	31.71	22.55	13.37	13.30	4.85	0.0000023
3	6.46	7.37	3.13	3.34	-1.99	0.046
4	2.15	3.18	1.65	1.73	-4.31	0.000026
5	23.35	21.84	7.29	6.87	1.51	0.13
6	2.22	1.95	1.56	1.65	1.20	0.23
7	7.96	9.41	3.39	3.17	-3.12	0.0021
8	8.02	7.40	1.63	1.98	2.45	0.015
9	5.25	5.12	1.90	2.17	0.44	0.66
10	1.61	1.00	1.25	0.97	3.84	0.00017

OVERACHIEVER CLUSTERS

CLUSTER	OA-MN	UA-MN	OA-SD	UA-SD	T	P-TWO TAILED
1	5.62	4.44	2.64	2.44	3.29	0.0012
2	3.60	2.42	2.08	2.01	4.07	0.000067
3	10.29	7.69	4.58	4.59	4.01	0.000085
4	3.63	4.22	2.01	2.14	-2.01	0.045
5	36.24	33.01	10.53	11.04	2.12	0.035
6	14.52	12.88	5.06	4.86	2.33	0.021
7	8.01	8.84	3.45	3.34	-1.72	0.087
8	5.55	4.81	1.89	2.21	2.57	0.011
9	4.83	4.32	2.05	2.22	1.71	0.088
10	2.07	1.34	1.60	1.18	3.61	0.00039

UNDERACHIEVER CLUSTERS

CLUSTER	OA-MN	UA-MN	OA-SD	UA-SD	T	P-TWO TAILED
1	3.43	3.02	2.34	2.19	1.27	0.21
2	19.04	12.46	9.02	8.38	5.32	0.0000003
3	3.05	1.99	1.81	1.83	4.14	0.000050
4	26.25	26.82	8.90	9.13	-0.45	0.66
5	13.13	14.30	6.20	6.27	-1.32	0.19
6	6.30	5.92	3.39	3.56	0.77	0.45
7	4.61	4.84	2.02	2.16	-0.78	0.44
8	3.87	3.37	1.61	1.60	2.18	0.030
9	1.98	1.97	1.49	1.54	0.07	0.94
10	5.86	5.86	1.48	1.81	0.01	0.99

APPENDIX D
ITEM ANALYSIS

This is a tabulation comparing the responses of the over- and underachievers on each item of the SSHA. To permit comparability, the responses of the 229 over-achievers, and the 182 underachievers have been converted to percentages.

A T-test was applied to the means of the two groups for each item to give an indication of the significance of the response differences between the groups.

Item No.	1	1	2	3	4	5	
Overachievers		29	40	17	10	3	P = 0.0000088
Underachievers		14	41	17	18	9	
Item No.	2	1	2	3	4	5	
Overachievers		2	7	7	37	47	P = 0.16
Underachievers		2	5	6	29	57	
Item No.	3	1	2	3	4	5	
Overachievers		17	48	21	10	4	P = 0.15
Underachievers		12	42	34	10	3	
Item No.	4	1	2	3	4	5	
Overachievers		43	27	7	12	11	P = 0.19
Underachievers		30	35	14	10	12	
Item No.	5	1	2	3	4	5	
Overachievers		14	9	9	29	40	P = 0.0
Underachievers		33	13	9	22	23	
Item No.	6	1	2	3	4	5	
Overachievers		14	36	17	19	14	P = 0.0
Underachievers		46	31	12	6	6	
Item No.	7	1	2	3	4	5	
Overachievers		7	30	26	30	7	P = 0.00080
Underachievers		15	35	24	24	2	
Item No.	8	1	2	3	4	5	
Overachievers		17	15	10	28	29	P = 0.0086
Underachievers		4	22	9	26	38	

Item No. 9	1	2	3	4	5	
Overachievers	14	30	29	13	14	P = 0.045
Underachievers	8	30	29	16	18	
Item No. 10	1	2	3	4	5	
Overachievers	51	30	9	6	4	P = 0.045
Underachievers	60	25	8	5	1	
Item No. 11	1	2	3	4	5	
Overachievers	28	38	18	9	7	P = 0.65
Underachievers	26	34	24	10	6	
Item No. 12	1	2	3	4	5	
Overachievers	8	16	16	35	24	P = 0.0
Underachievers	19	27	19	26	9	
Item No. 13	1	2	3	4	5	
Overachievers	5	15	22	36	21	P = 0.00011
Underachievers	13	24	18	34	11	
Item No. 14	1	2	3	4	5	
Overachievers	4	14	15	29	37	P = 0.00095
Underachievers	10	18	19	29	24	
Item No. 15	1	2	3	4	5	
Overachievers	40	28	15	11	7	P = 0.19
Underachievers	47	27	9	12	5	
Item No. 16	1	2	3	4	5	
Overachievers	59	26	7	3	4	P = 0.00017
Underachievers	40	33	11	7	9	
Item No. 17	1	2	3	4	5	
Overachievers	6	8	7	30	50	P = 0.0
Underachievers	16	14	10	34	26	
Item No. 18	1	2	3	4	5	
Overachievers	31	38	18	11	1	P = 0.00017
Underachievers	52	28	14	5	1	
Item No. 19	1	2	3	4	5	
Overachievers	28	37	18	10	8	P = 0.088
Underachievers	20	41	14	14	10	
Item No. 20	1	2	3	4	5	
Overachievers	3	11	14	41	31	P = 0.60
Underachievers	2	14	17	39	29	

Item No.	21	1	2	3	4	5	
Overachievers		22	28	16	18	16	P = 0.000029
Underachievers		36	31	12	15	5	
Item No.	22	1	2	3	4	5	
Overachievers		31	30	17	14	9	P = 0.045
Underachievers		27	26	18	11	18	
Item No.	23	1	2	3	4	5	
Overachievers		26	38	23	8	5	P = 0.018
Underachievers		14	42	24	14	6	
Item No.	24	1	2	3	4	5	
Overachievers		13	28	23	26	10	P = 0.44
Underachievers		9	29	29	19	15	
Item No.	25	1	2	3	4	5	
Overachievers		39	25	13	12	10	P = 0.00013
Underachievers		22	28	18	8	24	
Item No.	26	1	2	3	4	5	
Overachievers		24	30	18	15	13	P = 0.00018
Underachievers		42	26	15	10	7	
Item No.	27	1	2	3	4	5	
Overachievers		10	35	25	18	12	P = 0.82
Underachievers		15	32	19	20	14	
Item No.	28	1	2	3	4	5	
Overachievers		17	27	20	19	18	P = 0.34
Underachievers		20	25	24	14	16	
Item No.	29	1	2	3	4	5	
Overachievers		18	19	10	32	21	P = 0.0
Underachievers		34	23	12	24	8	
Item No.	30	1	2	3	4	5	
Overachievers		27	29	13	15	17	P = 0.0
Underachievers		62	20	6	4	8	
Item No.	31	1	2	3	4	5	
Overachievers		40	42	13	4	1	P = 0.0
Underachievers		73	23	3	1	1	
Item No.	32	1	2	3	4	5	
Overachievers		51	20	11	11	7	P = 0.0
Underachievers		22	30	17	11	20	

Item No. 33	1	2	3	4	5	
Overachievers	10	27	21	19	23	P = 0.062
Underachievers	16	26	24	17	17	
Item No. 34	1	2	3	4	5	
Overachievers	21	37	22	13	6	P = 0.019
Underachievers	26	44	19	7	4	
Item No. 35	1	2	3	4	5	
Overachievers	25	45	20	8	3	P = 0.070
Underachievers	14	48	26	10	1	
Item No. 36	1	2	3	4	5	
Overachievers	36	25	12	14	13	P = 0.11
Underachievers	32	19	15	20	15	
Item No. 37	1	2	3	4	5	
Overachievers	14	34	21	19	12	P = 0.000001
Underachievers	5	25	18	22	29	
Item No. 38	1	2	3	4	5	
Overachievers	30	40	15	10	5	P = 0.055
Underachievers	42	34	11	10	3	
Item No. 39	1	2	3	4	5	
Overachievers	34	45	12	8	2	P = 0.00052
Underachievers	18	47	21	11	3	
Item No. 40	1	2	3	4	5	
Overachievers	13	38	20	17	12	P = 0.0000032
Underachievers	3	23	32	25	17	
Item No. 41	1	2	3	4	5	
Overachievers	25	36	22	11	5	P = 0.000020
Underachievers	14	32	23	18	13	
Item No. 42	1	2	3	4	5	
Overachievers	16	32	21	17	14	P = 0.43
Underachievers	26	24	18	15	17	
Item No. 43	1	2	3	4	5	
Overachievers	60	28	7	3	2	P = 0.96
Underachievers	59	29	7	3	2	
Item No. 44	1	2	3	4	5	
Overachievers	39	38	12	7	3	P = 0.000076
Underachievers	22	44	18	11	5	

Item No. 45	1	2	3	4	5	
Overachievers	17	29	17	20	17	P = 0.20
Underachievers	15	22	22	21	20	
Item No. 46	1	2	3	4	5	
Overachievers	13	34	28	15	10	P = 0.00011
Underachievers	24	39	23	9	5	
Item No. 47	1	2	3	4	5	
Overachievers	18	47	22	10	2	P = 0.16
Underachievers	14	48	21	13	4	
Item No. 48	1	2	3	4	5	
Overachievers	33	33	18	10	5	P = 0.14
Underachievers	32	27	15	17	8	
Item No. 49	1	2	3	4	5	
Overachievers	11	42	24	14	9	P = 0.0014
Underachievers	6	33	28	18	15	
Item No. 50	1	2	3	4	5	
Overachievers	23	38	21	12	7	P = 0.0028
Underachievers	30	43	15	9	3	
Item No. 51	1	2	3	4	5	
Overachievers	9	20	14	32	24	P = 0.029
Underachievers	14	16	20	41	9	
Item No. 52	1	2	3	4	5	
Overachievers	21	22	14	33	10	P = 0.0
Underachievers	48	27	13	11	1	
Item No. 53	1	2	3	4	5	
Overachievers	16	30	29	15	10	P = 0.0
Underachievers	8	21	21	25	25	
Item No. 54	1	2	3	4	5	
Overachievers	12	23	20	30	16	P = 0.41
Underachievers	14	21	23	31	12	
Item No. 55	1	2	3	4	5	
Overachievers	32	49	14	4	1	P = 0.0000048
Underachievers	19	47	20	9	5	
Item No. 56	1	2	3	4	5	
Overachievers	79	13	3	2	3	P = 0.54
Underachievers	74	15	8	2	2	

Item No. 57	1	2	3	4	5	
Overachievers	18	34	19	14	15	P = 0.0
Underachievers	9	18	21	27	25	
Item No. 58	1	2	3	4	5	
Overachievers	13	27	24	30	6	P = 0.53
Underachievers	19	20	21	24	15	
Item No. 59	1	2	3	4	5	
Overachievers	39	33	16	7	5	P = 0.39
Underachievers	32	38	16	10	3	
Item No. 60	1	2	3	4	5	
Overachievers	21	35	24	11	9	P = 0.000067
Underachievers	9	31	30	16	13	
Item No. 61	1	2	3	4	5	
Overachievers	23	36	22	13	7	P = 0.34
Underachievers	22	34	20	13	10	
Item No. 62	1	2	3	4	5	
Overachievers	24	40	17	11	8	P = 0.017
Underachievers	37	31	18	10	3	
Item No. 63	1	2	3	4	5	
Overachievers	39	41	15	5	1	P = 0.18
Underachievers	46	38	10	4	1	
Item No. 64	1	2	3	4	5	
Overachievers	34	31	13	13	9	P = 0.0022
Underachievers	24	25	20	18	14	
Item No. 65	1	2	3	4	5	
Overachievers	10	16	22	30	22	P = 0.27
Underachievers	8	15	20	30	27	
Item No. 66	1	2	3	4	5	
Overachievers	20	34	21	17	8	P = 0.00050
Underachievers	33	36	17	8	5	
Item No. 67	1	2	3	4	5	
Overachievers	53	26	12	5	4	P = 0.77
Underachievers	57	22	12	4	5	
Item No. 68	1	2	3	4	5	
Overachievers	16	21	15	29	19	P = 0.64
Underachievers	20	18	19	22	22	

Item No. 69	1	2	3	4	5	
Overachievers	36	32	17	9	6	P = 0.0076
Underachievers	23	37	21	9	10	
Item No. 70	1	2	3	4	5	
Overachievers	6	15	16	29	34	P = 0.000067
Underachievers	16	16	21	25	21	
Item No. 71	1	2	3	4	5	
Overachievers	13	21	31	26	9	P = 0.029
Underachievers	9	19	32	20	19	
Item No. 72	1	2	3	4	5	
Overachievers	7	16	25	38	14	P = 0.0
Underachievers	18	28	21	27	6	
Item No. 73	1	2	3	4	5	
Overachievers	1	13	12	34	40	P = 0.0000026
Underachievers	9	18	18	31	24	
Item No. 74	1	2	3	4	5	
Overachievers	20	34	26	11	8	P = 0.000066
Underachievers	24	47	21	7	1	
Item No. 75	1	2	3	4	5	
Overachievers	47	37	10	4	1	P = 0.093
Underachievers	55	34	8	2	2	
Item No. 76	1	2	3	4	5	
Overachievers	82	14	1	2	1	P = 0.80
Underachievers	81	14	3	1	1	
Item No. 77	1	2	3	4	5	
Overachievers	57	17	6	11	8	P = 0.070
Underachievers	42	26	13	10	10	
Item No. 78	1	2	3	4	5	
Overachievers	11	18	16	34	21	P = 0.11
Underachievers	16	19	19	25	21	
Item No. 79	1	2	3	4	5	
Overachievers	62	28	6	4	0	P = 0.48
Underachievers	68	22	7	2	2	
Item No. 80	1	2	3	4	5	
Overachievers	63	21	10	4	1	P = 0.82
Underachievers	62	24	9	4	1	

Item No. 81	1	2	3	4	5	
Overachievers	38	38	10	7	7	P = 0.0
Underachievers	12	31	15	20	21	
Item No. 82	1	2	3	4	5	
Overachievers	35	35	13	13	4	P = 0.00012
Underachievers	55	29	8	4	4	
Item No. 83	1	2	3	4	5	
Overachievers	73	19	5	1	2	P = 0.56
Underachievers	73	16	8	2	2	
Item No. 84	1	2	3	4	5	
Overachievers	87	10	0	1	2	P = 0.016
Underachievers	75	18	4	2	2	
Item No. 85	1	2	3	4	5	
Overachievers	30	18	16	16	21	P = 0.0
Underachievers	53	19	8	12	8	
Item No. 86	1	2	3	4	5	
Overachievers	33	42	13	6	6	P = 0.032
Underachievers	48	33	8	6	5	
Item No. 87	1	2	3	4	5	
Overachievers	34	37	16	11	3	P = 0.32
Underachievers	30	38	16	10	5	
Item No. 88	1	2	3	4	5	
Overachievers	17	39	18	20	7	P = 0.021
Underachievers	10	34	26	21	10	
Item No. 89	1	2	3	4	5	
Overachievers	8	16	19	30	27	P = 0.0
Underachievers	22	24	14	32	8	
Item No. 90	1	2	3	4	5	
Overachievers	3	7	6	18	66	P = 0.00024
Underachievers	9	8	12	21	51	
Item No. 91	1	2	3	4	5	
Overachievers	46	31	12	8	3	P = 0.71
Underachievers	43	37	12	5	3	
Item No. 92	1	2	3	4	5	
Overachievers	37	31	15	9	8	P = 0.000067
Underachievers	58	26	6	5	4	

Item No. 93	1	2	3	4	5	
Overachievers	3	5	9	22	61	P = 0.0022
Underachievers	10	9	7	22	51	
Item No. 94	1	2	3	4	5	
Overachievers	8	25	24	25	18	P = 0.0050
Underachievers	7	38	26	18	11	
Item No. 95	1	2	3	4	5	
Overachievers	29	35	19	12	5	P = 0.51
Underachievers	23	38	23	10	5	
Item No. 96	1	2	3	4	5	
Overachievers	42	31	8	10	9	P = 0.0
Underachievers	21	27	18	14	20	
Item No. 97	1	2	3	4	5	
Overachievers	28	25	22	17	8	P = 0.031
Underachievers	37	26	17	16	4	
Item No. 98	1	2	3	4	5	
Overachievers	24	40	20	11	5	P = 0.44
Underachievers	19	40	30	7	5	
Item No. 99	1	2	3	4	5	
Overachievers	3	21	21	35	19	P = 0.49
Underachievers	8	20	16	38	18	
Item No. 100	1	2	3	4	5	
Overachievers	24	30	24	13	8	P = 0.00046
Underachievers	15	24	27	17	16	

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